The Best Way to Learn About ABET Accreditation Processes and Criteria is to Become a Program Evaluator

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What's New at ABET in 2018 ?

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October 2018

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EAC Criterion 3/5
CAC Criterion 3/5
CAC Cybersecurity
EAC Cyberengineering
Alternate Visit Protocols

ETAC Criterion 3/5
ETAC Program Criteria
ANSAC Natural Sciences
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Global Expansion

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EAC Criterion 3 & Criterion 5 Modification Status

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The EAC has been gathering comments on C3-C5 since July, 2014.

JULY 2014

Approval to send 1-6 for informal public comment.

JULY 2015

Informal comments incorporated. 1-7 created. Sent for formal First Reading. Comments requested.

JULY 2016

Formal comments incorporated. Changes viewed as major. Sent for formal First Reading.

JULY 2017

Formal comments incorporated. Approved on Second Reading; to be implemented in 2019 – 2020 accreditation cycle.

The EAC has implemented a year of preparation before the new criteria will take effect.

Spring 2017	Summer 2017	Fall 2017	Winter 2017
Proposed Criteria out for Review	Approval by EAC	Approval by EAD	Programs Prepare

Programs Continue to Prepare
Education for All Constituents and Training for TCs and PEVs

Spring 2018	Summer 2018	Fall 2018	Winter 2018

Spring 2019	Summer 2019	Fall 2019	Winter 2019
Programs Prepare TCs and PEVs Train	First Self-Studies for New Criteria Received, Visits Occur		

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CAC 3/5 Revisions: Status

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CAC Revisions: Motivation

- General Criteria
  - Enhance readability and clarity
  - Make it easier for assessment
  - Increase consistency between program criteria
  - Attempt greater harmony with EAC criteria
- Program Criteria
  - Align CS with CS2013 curricular guidelines and recent developments in computer science education
  - Align IS and IT Criteria with General Criteria changes

General Criteria: Highlights

- Criterion 3, Student Outcomes **Now Required**
  1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
  2. Design, implement, and evaluate a computer computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
  3. Communicate effectively in a variety of professional contexts.
  4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
  5. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Criterion 5, Curriculum **Now Required**
  - Principles and practices for security for all computing programs

Program Criteria: Highlights

- CS
  - Required additional student outcome
  - Curricular changes – highlights
    - Exposure to computer architecture and organization, information management, networking and communication, operating systems, and parallel and distributed computing.
    - Reduced math and science requirements, per CS2013 guidelines
  - Faculty with doctoral degree responsible for improving program
- IS and IT
  - Each has a required additional student outcome
- IS
  - Faculty with doctoral degree responsible for improving program

(Words might still change)

CAC 3/5 Revisions: Timeline

Date(s)	Event
07/2016	Commission approved revised criteria
10/2016	ABET's CAD approved criteria for first reading
11/2016 – 06/2017	First reading criteria posted on ABET website Public review and comment period
07/2017	Request commission to approve revised criteria and a rollout plan
10/2017	CAD approves; revisions become official CAC criteria applicable in the 2018 – 2019 OR the 2019 - 2020 accreditation cycle

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CAC Program Criteria for Cybersecurity: Status

One Year Offset to 3/5 Revisions

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Background

- Cyber Education Project, started in July 2014
  - Draft Learning Objectives and Draft Accreditation Criteria
- CEP successor efforts
  - Engineering efforts (not presented here)
  - Joint Task Force for Cybersecurity Education
    - Includes ACM, IEEE-CS and AIS
    - Developing a cybersecurity education model curriculum
    - CSEC2017 v. 0.5 Report, January 2017
      - https://www.csec2017.org/csec2017-v-0-5
- CSAB
  - ABET Lead Professional Society for Cybersecurity

Cybersecurity Criteria Overview

- Based on CSEC 2017 draft recommendations
- Computing-based but supplemented with other areas
- Stylized to fit CAC standard approach
  - General Criteria: same as First Reading CAC Criteria
  - Cybersecurity Program Criteria
    - Criterion 3 Student Outcomes
    - Criterion 5 Curriculum
- Applicable to *computing programs* with a variety of titles
  - Cybersecurity, computer security, cyber operations, information assurance, information security, or similar terms in their titles

One Year Offset to 3/5 Revisions

Cybersecurity Criteria: Timeline

Date(s)	Event
08/2016 – 03/2017	Criteria development, with feedback from CAC ExCom, CAC, CAD, PEVs and CAC programs
07/2017	Submit draft Criteria to CAC for approval
07/2017 – 10/2017	CAC approves, submits criteria to CAD for approval Conduct pilot visits for cybersecurity
11/2017 – 06/2018	CAD approves on first reading; posted on ABET website for Public Review & Comment
07/2018	Submit revised criteria & rollout plan for CAC approval
10/2018	If CAC approves, present revised criteria and rollout plan to CAD

Cybersecurity at 2 Year Colleges

- Workforce demand for cybersecurity professionals overwhelms current supply
- Idea: accreditation for cybersecurity programs at 2YCs
  - Adapt the BS in cybersecurity to be appropriate for 2YC AS programs
  - Facilitate flow of two-year grads to four-year cybersecurity programs
  - Align with NSA Centers for Academic Excellence program
- Current “listening sessions” with 2YC department heads, program directors, faculty will continue through 2018
  - Assess market demand
  - Explore nature of potential criteria

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New at ABET 2018
Cyberengineering

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Program Criteria for Cybersecurity Engineering

- In January 2016, IEEE established a committee to develop Cybersecurity Engineering program criteria
- Drafts were circulated and reviewed within the community from July 2016 through early 2017
- CSAB and INCOSE became involved in the conversation as societies with significant interest in the area
- Guiding Principle: Accredited programs in cybersecurity engineering should prepare graduates to apply engineering analysis, design, and problem solving to address issues of security, protection, and survivability in the presence of risks and threats

Curricular Aspects of Cybersecurity Engineering - Topics

- Probability, statistics, and cryptographic topics with appropriate practical applications
- Discrete math plus specialized topics in mathematics such as topics in abstract algebra, information theory, number theory, complexity theory, and finite fields
- Engineering topics necessary to determine cybersecurity requirements and to analyze, design, test, and protect complex devices and systems that incorporate hardware, software, and human components
- Application of protective technologies and forensic techniques
- Analysis and evaluation of components and systems with respect to security and to maintaining operations in the presence of risks and threats
- Consideration of legal and regulatory issues, privacy, ethics, and human behavior

Curricular Aspects of Cybersecurity Engineering - Scope

- The curriculum must provide both breadth and depth across the range of engineering and computing topics necessary for the application of computer security principles and practices to the design, implementation, and operation of the physical, software, and human components of a system, as appropriate to the program.

Status of Program Criteria for Cybersecurity Engineering

- Program Criteria for Security, Cybersecurity, Information Assurance, and Similarly Named Engineering Programs were approved by the Engineering Area Delegation on first reading in the fall of 2017 with IEEE, INCOSE, and CSAB as co-lead societies and published for public review and comment
- Based on input received during the review and comment period, revised Program Criteria for Cybersecurity and Similarly Named Engineering Programs were developed and approved by the EAC in July 2018
- These revised Program Criteria will be considered by the Engineering Area Delegation for approval and implementation in 2019-20

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Alternative Visit Protocol

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Alternative Visit Protocol – Why Do We Need It?

- May not be able to conduct a regularly-scheduled, conventional visit
  - Security concerns at visit location
  - Health-related matters at visit location
- The security/health of our personnel on international assignments is of paramount importance
- So, what do we do?
  - Postpone? Defer? Cancel? Do something else?
    - AV Pro
- Role of Global Rescue in assessing risk and supporting visits

Alternative Visit Protocol – Types of Visits

- Conventional
  - Whole team at the institution for the duration of the visit
- Alternative Visit Protocol - Virtual
  - Whole team will work face-to-face but not on campus
  - All business transacted via video conferencing and secure electronic access to materials
  - Team housed at ABET HQ
- Alternative Visit Protocol - Hybrid
  - Combination of modalities, personnel, and locations used to conduct a visit
  - The whole team will work F2F in one location with some travel on the part of the TC or designee, who may be remotely located for some or all of the duration of the visit

Alternative Visit Protocol – Review Considerations

- Initial review must be conventional. In some cases the hybrid approach may also be used
  - Programs at institutions that are new to ABET vs. a new program at an institution with ABET experience – application of judgement!
  - Special circumstances for a review (e.g. previous action of Not-to-Accredit or Show Cause OR the complexity of review) may dictate that the review be conventional
- Important to have a regular cycle of conventional reviews to maintain the integrity of the process
  - AV Pro reviews may be alternated with conventional reviews if the circumstances in country demand that

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ETAC Criterion 3 & Criterion 5 Modification Status

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Contents

- After one year of public review and comment:

  Proposed Changes to ETAC Criteria 3, 5 & 6

  Changes to Program Criteria

  are to be acted on at November 2018 ETAD meeting.
- Changes to the Program Criteria format
- Pilot visits are being conducted in the 2018-19 cycle.

Criterion 3 – Associate Degree

Current ETAC Criteria	Proposed ETAC Criteria
a. an ability to apply the knowledge, techniques, skills, and modern tools of the discipline to narrowly defined engineering technology activities; **b.** an ability to apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require limited application of principles but extensive practical knowledge **e.** an ability to identify, analyze, and solve narrowly defined engineering technology problems;	**(1)** an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve well-defined engineering problems appropriate to the discipline;

Criterion 3 – Associate Degree

Current ETAC Criteria	Proposed ETAC Criteria
No direct equivalent in current ETAC criteria—“design” added from the International Engineering Alliance (IEA) Dublin Accords Graduate Attribute DA3: Design solutions for *well-defined technical problems* and *assist with* the design of systems, components or processes to meet specified needs ….	**(2)** an ability to design solutions for well-defined technical problems and assist with engineering design of systems, components, or processes appropriate to the discipline;

Criterion 3 – Associate Degree

Current ETAC Criteria	Proposed ETAC Criteria
c. an ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments;	**(3)** not changed;
d. an ability to function effectively as a member of a technical team;	**(4)** not changed;
f. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;	**(5)** not changed;

Criterion 3 – Associate Degree

Current ETAC Criteria	Proposed ETAC Criteria
g. an understanding of the need for and an ability to engage in self-directed continuing professional development	Moved to curriculum
h. an understanding of and a commitment to address professional and ethical responsibilities, including a respect for diversity	Moved to curriculum
i. a commitment to quality, timeliness, and continuous improvement	Moved to curriculum

Criterion 3 – Baccalaureate Degree

Current ETAC Criteria	Proposed ETAC Criteria
a. an ability to select and apply the knowledge, techniques, skills, and modern tools of the discipline to broadly-defined engineering technology activities; **b.** an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies **f.** an ability to identify, analyze, and solve broadly-defined engineering technology problems;	**(1)** an ability to apply knowledge, techniques, skills, and modern tools of mathematics, science, engineering, or technology to solve broadly-defined engineering problems appropriate to the discipline;

Criterion 3 – Baccalaureate Degree

Current ETAC Criteria	Proposed ETAC Criteria
d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives;	**(2)** an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to the discipline;
c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes;	**(3)** an ability to conduct standard tests, measurements, experiments and to analyze and interpret the results to improve processes;

Criterion 3 – Baccalaureate Degree

Current ETAC Criteria	Proposed ETAC Criteria
e. an ability to function effectively as a member or leader on a technical team;	**(4)** an ability to function effectively as a member or as a leader on a technical team;
g. an ability to apply written, oral, and graphical communication in both technical and non-technical environments; and an ability to identify and use appropriate technical literature;	**(5)** an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;

Criterion 3 – Baccalaureate Degree

Current ETAC Criteria	Proposed ETAC Criteria
h. an understanding of the need for and an ability to engage in self-directed continuing professional development;	Moved to curriculum
i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity;	Moved to curriculum
j. a knowledge of the impact of engineering technology solutions in a societal and global context; and	Moved to curriculum
k. a commitment to quality, timeliness, and continuous improvement.	Moved to curriculum

Criterion 5 – Curriculum

Current ETAC Criteria	Proposed ETAC Criteria
The curriculum must effectively develop the following subject areas in support of student outcomes and program educational objectives.	Curricular requirements specify topics appropriate to engineering technology but do not prescribe courses. The curriculum must combine technical, professional and general education components in support of student outcomes. To differentiate the discipline, Program Criteria may add specificity for program curricula. The curriculum must include the following:

Criterion 5 – Curriculum

Current ETAC Criteria	Proposed ETAC Criteria
Technical Content	Technical Content
Added	**d.** Include design considerations appropriate to the discipline and degree level such as: industry and engineering standards and codes; public safety and health; and local and global impact of engineering solutions on individuals, organizations, and society; e. Include topics related to professional and ethical responsibilities, respect for diversity; and quality and continuous improvement.

Criterion 3 & 5 – Advantages

- Similar to EAC and CAC proposed changes
- Reduces the required number of Student Outcomes
- Reduces assessment burden
  - Fewer Student Outcomes are required by General Criteria
  - Adds performance indicators for assessment
- Moves some of the difficult/impossible to measure items to Criterion 5, Curriculum
- Programs not required to change Student Outcomes to comply*
- Strengthens ties between General Criteria and Program Criteria.

Criterion 3 & 5 – Disadvantages

- * Associate Degree program compelled to put appropriate “design” (back) into their Student Outcomes.
- All Student Outcomes identified by the program must be assessed. To take advantage of reduced assessment burden, programs must change their outcomes.
- Program must ensure that curricular requirements are met.

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ETAC Program Criteria Modification Status

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Program Criteria – Background

- Mission
- Program Educational Objectives (PEOs)
  - Attained after graduation
  - Support accomplishment of the mission
- Student Outcomes (SOs)
  - Attained by students before graduation
  - Support accomplishment of PEOs
- Curriculum
  - Means and materials to achieve SOs
- Program Criteria
  - Specificity of curriculum to differentiate the discipline

Program Criteria

- ETAC has revised Program Criteria template for societies.
- Template includes sections for Associate and Baccalaureate degree requirements.
- Under each of these sections, societies may differentiate the discipline by specifying requirements for:
  - Curriculum
  - Faculty
- Discipline-specific requirements are not intended to place additional burden on programs.

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What's New in the Applied and Natural Science Accreditation Commission

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Name Change Reflecting Expanded Scope of Commission

- In March 2017, the ABET Board of Directors and ABET Board of Delegates approved a name change for the Applied Science Accreditation Commission to the Applied and Natural Science Accreditation Commission (ANSAC).
- The Commission began doing pilot visits to natural science programs under the then ASAC General Criteria.

Changes to Criterion 3 and 5

ANSAC has revised its Criterion 3 and 5, which revisions will be approved on second reading on November 3, 2018.

Addition to Definitions Section

- **College level Mathematics** consists of mathematics that requires a degree of mathematical sophistication at least equivalent to that of college algebra. For illustrative purposes, some examples of college-level mathematics include college algebra, precalculus, calculus, differential equations, probability, statistics, linear algebra and discrete mathematics.
- **Natural Science** increases the knowledge base of a field of research and science collectively that are involved in the study of the physical world and its phenomena. Natural science consists of but is not limited to biology, physics, chemistry, geology and other natural sciences including life, earth and space sciences.
- **Applied Science** uses the knowledge base in natural science to solve specific problems.

Criterion 3. Student Outcomes changes

The program must have documented student outcomes that prepare graduates to attain the program educational objectives. There must be a documented and effective process for the periodic review and revision of these student outcomes.

Associate Level

A. Associate degree program student outcomes must include, but are not limited to the following:

- (1) An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.
- (2) An ability to conduct experiments or test theories, as well as to analyze and interpret data
- (3) An ability to function on teams
- (4) An understanding of professional and ethical responsibility
- (5) An ability to communicate effectively

Baccalaureate Level

B. Baccalaureate degree program student outcomes must include, but are not limited to the following:

- (1) An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.
- (2) An ability to formulate or design a system, process, procedure or program to meet desired needs.
- (3) An ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions

Criterion 3 Baccalaureate cont'd

- (4) An ability to communicate effectively with a range of audiences
- (5) An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts
- (6) An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Criterion 5 Revision

The curriculum requirements specify subject areas appropriate to applied or natural sciences programs but do not prescribe specific courses. For the purposes of accreditation, mathematics and statistics programs may be reviewed under the definition of applied and natural sciences. The program's faculty must assure that the curriculum devotes adequate attention and time to each component, consistent with the objectives of the program and institution, while preparing students for life-long learning

Criterion 5 cont'd

The curriculum must include:

- a. combination of college-level mathematics and sciences (some with laboratory and/or experimental experience) appropriate to the discipline
- b. advanced technical and/or science topics appropriate to the program
- c. a general education component that complements the technical and scientific content of the curriculum and is consistent with the program and institution objectives.

Criterion 5 cont'd

Students in baccalaureate degree programs must also be prepared for practice in a field of applied or natural sciences through a curriculum culminating in comprehensive projects or experiences based on the cumulative knowledge and skills acquired in earlier course work.

ANSAC Conducting Natural Science Pilot Visits

- ANSAC began conducting pilot visits in 2015-16 and accredited a chemistry program and a pharmacobiology program.
- ANSAC to review program criteria in geology next month.
- Planning to accredit additional programs in chemistry, mathematics, biotechnology, biology, actuarial science, nursing science.
- Most, but not all, the programs are international.

Societies Taking Curricular Responsibility

- SME-AIME has agreed to take curricular responsibility for geology programs
- AAEES has agreed to take curricular responsibility for environmental science programs
- In discussions with other ABET member and non-member societies about taking on other disciplines

International Facility Management Association Applies for ABET Membership

- On September 4, 2018 the International Facility Management Association applied to ABET to become a member, taking curricular responsibility for facility management and similarly named programs and bring the programs IFMA has already accredited both in the U.S. and abroad into ABET.

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Non-Degree Credentials

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Types of Non-Degree Credentials

- **Certificates below Associate's Degree**
  - 1 M "for-credit" certificates awarded in 2013 versus 1.8 M bachelor degrees
    - Not including certificates awarded by non-accredited institutions, "not for credit" certificates or badges
  - ABET-related disciplines: CS-IT, manufacturing and science/technology areas
  - 47% awarded by community colleges
- **Work-based training (apprenticeships, certifications, and licenses)**
- **Skill-based training (coding boot camps)**
  - 90+ in person coding camps plus ~200 online
  - 23k projected graduates (in person) in 2017
  - ~90% of students have bachelor's degrees
- **MOOCs (nano-degrees, specializations, micro-masters)**
  - 35 M students enrolled in at least one course in 2016
  - 80 providers
- **Combinations and Collaborations**

Non-Degree Credential Providers

> **"Traditional" vs "Non-traditional"**

- Traditional providers regionally accredited
- Traditional: community colleges, for profits, and 4 year private/public colleges and universities
- Non-traditional: coding boot camps, MOOCs

> **Traditional providers eligible for Title IV funding**

- DOE EQUIP program attempts to extend Title IV funding by partnering traditional/non-traditional and quality assurance body

Why the Interest?

- **Industry concerns on shortage of trained personnel in some areas**
- **Non-degree credentials seen as potentially cheaper, faster, more flexible and better aligned with employer needs**
- **Government engagement**
  - Reauthorization of the higher education act
  - Issues around effectiveness of accreditation
  - Diploma Mills and Title IV access
  - Political overtones – e.g., income inequality
- **Changing student demographics**
  - Non-traditional students: veterans; lower income
- **Proliferation/monetization of online education**

What Are the Issues?

- Lack of understanding of credential value and clear pathways to help students understand and reach their goals
- Proliferation of non-traditional educational providers
- Lack of transparency and consistency in quality assurance
- Evidence of efficacy of non-traditional provider non-degree credentials is thin

Relevance to ABET

- Consistent with ABET strategic priority
  - “Strengthen ABET’s core products and expand services to address the changing needs of our growing constituency”
- Non-degree credentials identified by many stakeholders as cheaper, faster, more aligned alternative way of delivering education and training
  - Will non-degree credentials compete/replace the bachelor’s degree?
- Flagged by IAC as an area for ABET to maintain/expand its distinctive relevance and direct connection with major technical employers

Current Project Status

- Market assessment survey completed
- Draft criteria and work process developed
- Invited by Lumina Foundation to submit proposal
  - Objective: “develop and implement a quality assurance system for non-degree credentials in technical disciplines within ABET’s purview.”
- Draft proposal completed addressing:
  - Proof of Concept (external panel review and pilot program)
  - Systems Development (marketing/communications plan, recruitment and training of reviewers, financial model, criteria/work process finalization, and governance and staffing model)
  - Start-up
- Proposal and related commitment currently being considered by ABET Board of Directors

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Global Expansion

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ACCREDITATION NUMBERS

AS OF OCTOBER 1, 2017

GLOBAL		U.S.		OUTSIDE U.S.	
3852 PROGRAMS	776 INSTITUTIONS	3175 PROGRAMS	637 INSTITUTIONS	677 PROGRAMS	139 INSTITUTIONS

INCREASES SINCE 2016

206 PROGRAMS **24** INSTITUTIONS

ACCREDITATION NUMBERS

AS OF OCTOBER 1, 2018

GLOBAL	U.S.	OUTSIDE U.S.
4005 PROGRAMS	3233 PROGRAMS	772 PROGRAMS
793 INSTITUTIONS	638 INSTITUTIONS	155 INSTITUTIONS

INCREASES SINCE 2017

153 PROGRAMS

17 INSTITUTIONS

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