Applied and Natural Science Accreditation Commission

CRITERIA FOR ACCREDITING

APPLIED AND NATURAL SCIENCE PROGRAMS

Effective for Reviews During the 2018-2019 Accreditation Cycle
Incorporates all changes approved by the ABET Board of Delegates
Applied and Natural Science Area Delegation as of October 20, 2017

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Criteria for Accrediting Applied and Natural Science Programs

Effective for Reviews during the 2018-2019 Accreditation Cycle

Definitions

While ABET recognizes and supports the prerogative of institutions to adopt and use the terminology of their choice, it is necessary for ABET volunteers and staff to have a consistent understanding of terminology. With that purpose in mind, the Commissions will use the following basic definitions:

Program Educational Objectives – Program educational objectives are broad statements that describe what graduates are expected to attain within a few years after graduation. Program educational objectives are based on the needs of the program's constituencies.

Student Outcomes – Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program.

Assessment – Assessment is one or more processes that identify, collect, and prepare data to evaluate the attainment of student outcomes. Effective assessment uses relevant direct, indirect, quantitative and qualitative measures as appropriate to the outcome being measured. Appropriate sampling methods may be used as part of an assessment process.

Evaluation – Evaluation is one or more processes for interpreting the data and evidence accumulated through assessment processes. Evaluation determines the extent to which student outcomes are being attained. Evaluation results in decisions and actions regarding program improvement.

The criteria for accreditation are in two sections.

General Criteria – General Criteria apply to all programs accredited by an ABET commission. Each program accredited by an ABET commission must satisfy every Criterion that is in the General Criteria for that commission.

Program Criteria – The Program Criteria provide discipline specific accreditation criteria. Programs must show that they satisfy all of the specific Program Criteria implied by the program title. Any overlapping requirements need be satisfied only once.

It is the responsibility of the program seeking accreditation to demonstrate clearly that the program meets the following criteria.

I. GENERAL CRITERIA FOR BACCALAUREATE AND ASSOCIATE DEGREE PROGRAMS

Criterion 1. Students

Student performance must be evaluated. Student progress must be monitored to foster success in attaining student outcomes, thereby enabling graduates to attain program **educational objectives. Students must be advised regarding curriculum and career matters.**

The program must have and enforce policies for accepting both new and transfer students, awarding appropriate academic credit for courses taken at other institutions, and awarding appropriate academic credit for work in lieu of courses taken at the institution. The program must have and enforce procedures to ensure and document that students who graduate meet all graduation requirements.

Criterion 2. Program Educational Objectives

The program must have published program educational objectives that are consistent with the mission of the institution, the needs of the program's various constituencies, and these criteria. There must be a documented, systematically utilized, and effective process, involving program constituencies, for the periodic review of these program educational objectives that ensures they remain consistent with the institutional mission, the program's constituents' needs, and these criteria.

Criterion 3. Student Outcomes

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.

A. Baccalaureate degree programs must demonstrate that graduates have:

(a) an ability to apply knowledge of mathematics, science, and applied sciences

(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to formulate or design a system, process, or program to meet desired needs

(d) an ability to function on multidisciplinary teams

(e) an ability to identify and solve applied science problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of 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 scientific and technical tools necessary for professional practice.

B. Associate degree programs must demonstrate that graduates have:

(a) an ability to apply knowledge of mathematics, sciences, and other related disciplines

(b) an ability to conduct experiments, as well as to analyze and interpret data

(c) an ability to identify, formulate, and solve applied science problems

(d) an ability to function on teams

(e) an understanding of professional and ethical responsibility

(f) an ability to communicate effectively

(g) a recognition of the need for and an ability to engage in life-long learning

(h) a knowledge of contemporary issues

(i) an ability to use the techniques, skills, and modern applied science tools necessary for professional practice

Criterion 4. Continuous Improvement

The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program.

Criterion 5. Curriculum

The curriculum requirements specify subject areas appropriate to applied science programs but do not prescribe specific courses. 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.

The curriculum must include:

(a) a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the discipline

(b) applied science topics appropriate to the program

(c) a general education component that complements the technical content of the

curriculum and is consistent with the program and institution objectives.

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

Criterion 6. Faculty

Each faculty member teaching in the program must have expertise and educational background consistent with the contributions to the program expected from the faculty member. The competence of faculty members must be demonstrated by such factors as education, professional credentials and certifications, professional experience, ongoing professional development, contributions to the discipline, teaching effectiveness, and communication skills. Collectively, the faculty must have the breadth and depth to cover all curricular areas of the program.

The faculty serving in the program must be of sufficient number to maintain continuity, stability, oversight, student interaction, and advising. Each faculty member must have sufficient responsibility and authority to improve the program through definition and revision of program educational objectives and student outcomes as well as through the implementation of a program of study that fosters the attainment of student outcomes.

Criterion 7. Facilities

Classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program.

The library services and the computing and information infrastructure must be adequate to support the scholarly and professional activities of the students and faculty.

Criterion 8. Institutional Support

Institutional support and leadership must be adequate to ensure the quality and continuity of the program.

Resources including institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs. The resources available to the program must be sufficient to attract, retain, and provide for the continued professional development of a qualified faculty. The resources available to the program must be sufficient to acquire, maintain, and operate infrastructures, facilities, and equipment appropriate for the program, and to provide an environment in which student outcomes can be attained.

II. GENERAL CRITERIA FOR MASTER'S LEVEL PROGRAMS

Criteria for master's level applied science programs are inclusive of those for baccalaureate level applied science programs with the following additions: one year of study beyond the baccalaureate level and a project or research activity resulting in a report that demonstrates both the mastery of the subject matter and a high level of communication skills.

III. PROGRAM CRITERIA

Each program must satisfy applicable Program Criteria. Program Criteria provide the specificity needed for interpretation of the General Criteria as applicable to a given discipline. If a program, by virtue of its title, becomes subject to two or more sets of Program Criteria, then that program must satisfy each set of Program Criteria; however, overlapping requirements need to be satisfied only once.

PROGRAM CRITERIA FOR CONSTRUCTION MANAGEMENT AND SIMILARLY NAMED PROGRAMS

Lead Society: Construction Management Association of America

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

Graduates of Construction Management programs will have the knowledge, as well as the technical, administrative and communication skills, necessary to succeed in the construction industry. Students must demonstrate the knowledge and skills to deliver construction projects with respect to scope, schedule, budget, quality, safety, and the environment. The professional component must include these topics:

1. Construction project management from pre-design through commissioning;
2. project life-cycle and sustainability;
3. health and safety, accident prevention, and regulatory compliance;
4. law, contract documents administration, and dispute prevention and resolution;
5. materials, labor and methods of construction;
6. finance and accounting principles;
7. planning and scheduling;
8. cost management including plan reading, quantity take offs and estimating;
9. project delivery methods;
10. leadership and managing people;
11. business and communication skills

Construction Management programs are expected to provide breadth across the range of topics. Other topic areas may be added as dictated by the Mission and Program Educational Objectives. Additionally, the extent to which each content area is developed and emphasized in a given program must be consistent with the program's mission and objectives.

Faculty

A full-time faculty member must be identified as administratively in charge of the program and preferably be full-time with the program.

II. PROGRAM CRITERIA FOR MASTER'S LEVEL PROGRAMS

Master's Level Admission Requirements

Admitted students must hold an earned baccalaureate degree that prepares them to apply the basic principles of college-level mathematics, or business and legal principles.

Exceptions may be admitted with an individually documented plan of study to compensate for any deficiencies.

Master's Level Curriculum

Criteria for master's level CM programs are inclusive of those for baccalaureate level CM programs with the following additions:

(a) A minimum of 30 credit hours or equivalent of study beyond the baccalaureate level CM programs, or CM-related programs, consisting of courses with increased depth and rigor;

(b) Included as part of the 30 credit hours, is an applied construction management project or research activity resulting in a final deliverable that demonstrates both mastery of the subject matter and a proficiency in oral and written communication skills;

(c) Advanced qualitative and quantitative problem-solving skills; and

(d) Other academic areas or specialties considered necessary by the program.

Master's Level Faculty

In addition to the general qualifications specified above for the baccalaureate level faculty, masters level faculty are expected to have construction industry experience and be engaged in research, publications, or conducting training activities appropriate to their institution's mission.

A full-time faculty member must be identified as being administratively in charge of the program.

PROGRAM CRITERIA FOR ENVIRONMENTAL, HEALTH, AND SAFETY AND SIMILARLY NAMED APPLIED SCIENCE PROGRAMS

Co-Lead Societies: American Industrial Hygiene Association or American Society of Safety Engineers

These program criteria apply to applied science programs having environmental, health, and safety in their program titles. Each program evaluated under these Program Criteria must designate which society is to serve as Lead Society for that program.

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Program Criteria presented herein provide the specificity needed to interpret the General Criteria with respect to the discipline of Environmental, Health, and Safety and furnish a framework upon which a given program must develop the more general Outcomes and Assessment requirements of Criteria 3, (a) through (k). In all cases, the program must demonstrate that graduates possess the knowledge, skills, and attitudes necessary to competently and ethically practice the applicable scientific, technical, and regulatory aspects of this discipline.

The basic level criteria as applied to the field of Environmental, Health, and Safety will be interpreted with respect to the following curricular content areas:

(a) environmental, health, and safety fundamentals;

(b) physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body;

I anticipation, identification, and evaluation of potentially hazardous agents, conditions and practices;

(d) fundamental exposure assessment techniques (both qualitative and quantitative);

I environmental, health, and safety data interpretation including statistical and epidemiological principles;

(f) development of hazard control designs, methods, procedures and programs;

(g) accident/incident investigation and analysis;

(h) industrial and construction safety;

(i) legal aspects of environmental, health, and safety practices;

(j) environmental, health and safety program management;

(k) hazardous materials/waste recognition, control, and remediation;

(l) air pollution fundamentals and control technologies;

(m) water pollution fundamentals and control technologies;

(n) environmental regulations and permitting processes;

(o) environmental sampling and measurement methodologies.

Note: In this context, the terms hazard and hazardous incorporate issues related to the broad context of occupational environmental, health, and safety.

Environmental, Health, and Safety programs are expected to provide breadth across the range of topics implied by the title. Thus, these curricular content areas are considered to be minimum requirements. Other areas may be added as dictated by the Mission and Program Educational Objectives of the specific program. Additionally, the extent to which each content area is developed and emphasized in a given program must also be consistent with the program's mission and objectives. Depending on the program, a given area may be addressed in a devoted course, a portion of a course, or in an appropriate extracurricular experience. Based upon this content, program faculty are free to develop unique outcomes at appropriate functional levels that embrace Criterion 3 (a) through (k) of the General Criteria.

Baccalaureate-level Faculty

The majority of core Environmental, Health, and Safety and other supporting faculty must hold an earned doctorate. ("Core faculty" pertains to those who are teaching Environmental, Health, and Safety courses and does not include faculty members teaching courses such as epidemiology, statistics, etc.). The majority of core faculty should hold certifications issued by nationally accredited credentialing bodies such as Certified Industrial Hygienist or Certified Safety Professional. Faculty must also demonstrate external professional activity, including, but not limited to, participation on national, regional, state, and/or local committees and advisory boards, professional practice, and/or editorial reviews of professional publications.

A full-time faculty member must be identified as administratively in charge of the program.

II. PROGRAM CRITERIA FOR MASTER'S LEVEL PROGRAMS

Master's-level Admission Requirements

Admitted students must hold an earned baccalaureate that prepares them to apply the basic principles of college-level mathematics, chemistry, physics, and biology. Exceptions may be admitted with an individually documented plan of study to compensate for any deficiencies.

Master's-level Curriculum

Criteria for master's-level programs require the following additions beyond the baccalaureate level: (i) minimum of one year of study beyond the basic-level, consisting of courses with increased depth and rigor; (ii) an applied science project or research activity resulting in a report that demonstrates both mastery of the subject matter and a high level of professional and public communication skills; (iii) an adequate foundation in statistics, applied sciences, and/or related professional practice; and, (iv) advanced qualitative and quantitative problem-solving skills.

Master's-level Faculty

In addition to the general qualifications specified above for baccalaureate-level faculty, master-level faculty are expected to have demonstrated research activity appropriate to their institution's mission.

A full-time faculty member must be identified as administratively in charge of the program.

PROGRAM CRITERIA FOR HEALTH PHYSICS AND SIMILARLY NAMED APPLIED SCIENCE PROGRAMS

Lead Society: American Industrial Hygiene Association
Cooperating Society: American Nuclear Society

These criteria apply to health physics or similarly named applied science programs.

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

The program must demonstrate that graduates possess the necessary knowledge, skills, and attitudes to competently and ethically implement and practice applicable scientific, technical, and regulatory aspects of Health Physics. More specifically, graduates must produce a culminating senior project and demonstrate competency in the following curricular areas:

(a) radiation physics

(b) radiation biology

(c) radiation detection and measurements with laboratory experience

(d) internal and external radiation dosimetry

(e) principles of radiation safety and health physics

(f) contemporary issues in health physics

Faculty

The faculty must have sufficient qualifications and must ensure proper guidance of the program and its evaluation and development. The faculty primarily committed to the program must demonstrate current knowledge of health physics through education and experience. The overall competence of the faculty may be judged by such factors as education, teaching experience, diversity of backgrounds, professional experience, ability to communicate, enthusiasm for developing more effective programs, level of scholarship, participation in professional societies, and certification by the American Board of Health Physics.

II. PROGRAM CRITERIA FOR MASTER'S LEVEL PROGRAMS

Master's-Level Admission Requirements

Admitted students must hold an earned baccalaureate that prepares them to apply the basic principles of college-level mathematics, physics and biology. Exceptions may be admitted with an individually documented plan of study to compensate for any deficiencies.

Master's-Level Curriculum

Criteria for master's-level programs require the following additions beyond the baccalaureate level:

(a) A minimum of one year of study beyond the basic-level, consisting of courses with increased depth and rigor;

(b) An applied science project or research activity resulting in a report that demonstrates both mastery of the subject matter and a high level of professional and public communication skills;

(c) An adequate foundation in statistics, applied sciences, and/or related professional practice; and,

(d) Advanced qualitative and quantitative problem-solving skills.

(e) Other academic areas or specialties considered important to the program.

Master's-Level Faculty

In addition to the general qualifications specified above for baccalaureate-level faculty, master's-level faculty are expected to have demonstrated research activity appropriate to their institution's mission.

A full-time faculty member must be identified as administratively in charge of the program.

PROGRAM CRITERIA FOR INDUSTRIAL HYGIENE AND SIMILARLY NAMED APPLIED SCIENCE PROGRAMS

Lead Society: American Industrial Hygiene Association
Cooperating Society: American Academy of Environmental Engineers and Scientists

These criteria apply to industrial hygiene or similarly named applied science programs.

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

The program must demonstrate that graduates have necessary knowledge, skills, and attitudes to competently and ethically implement and practice applicable scientific, technical, and regulatory aspects of Industrial Hygiene. To this end, graduates will be prepared to anticipate, recognize, evaluate, and control exposures of workers and others to physical, chemical, biological, ergonomic, and psychosocial factors, agents, and/or stressors that can potentially cause related diseases and/or dysfunctions. More specifically, graduates must be able to:

(a) identify agents, factors, and stressors generated by and/or associated with defined sources, unit operations, and/or processes;

(b) describe qualitative and quantitative aspects of generation of agents, factors, and stressors;

(c) understand physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body;

(d) assess qualitative and quantitative aspects of exposure assessment, dose-response, and risk characterization based on applicable pathways and modes of entry;

(e) calculate, interpret, and apply statistical and epidemiological data;

(f) recommend and evaluate engineering, administrative, and personal protective equipment controls and/or other interventions to reduce or eliminate hazards;

(g) demonstrate an understanding of applicable business and managerial practices;

(h) interpret and apply applicable occupational and environmental regulations;

(i) understand fundamental aspects of safety and environmental health

(j) attain recognized professional certification

Baccalaureate-level Faculty

The majority of core Industrial Hygiene and other supporting faculty must hold an earned doctorate. ("Core Industrial Hygiene faculty" pertains to those who are teaching industrial hygiene courses and does not include faculty members teaching courses such as

epidemiology, statistics, etc.). The majority of core Industrial Hygiene faculty should be Certified Industrial Hygienists; however, a minimum of one core Industrial Hygiene faculty member must be a Certified Industrial Hygienist. Faculty must also demonstrate external professional activity, including, but not limited to, participation on national, regional, state, and/or local committees and advisory boards, professional practice, and/or editorial reviews of professional publications.

A full-time faculty member must be identified as administratively in charge of the program.

II. PROGRAM CRITERIA FOR MASTER'S LEVEL PROGRAMS

Master's-level Admission Requirements

Admitted students must hold an earned baccalaureate that prepares them to apply the basic principles of college-level mathematics, inorganic and organic chemistry, physics, and biology. Exceptions may be admitted with an individually documented plan of study to compensate for any deficiencies.

Master's-level Curriculum

Criteria for master's-level programs require the following additions beyond the baccalaureate level: (i) minimum of one year of study beyond the basic-level, consisting of courses with increased depth and rigor; (ii) an applied science project or research activity resulting in a report that demonstrates both mastery of the subject matter and a high level of professional and public communication skills; (iii) an adequate foundation in statistics, applied sciences, and/or related professional practice; and, (iv) advanced qualitative and quantitative problem-solving skills.

Master's-level Faculty

In addition to the general qualifications specified above for baccalaureate-level faculty, master-level faculty are expected to have demonstrated research activity appropriate to their institution's mission.

A full-time faculty member must be identified as administratively in charge of the program.

PROGRAM CRITERIA FOR SAFETY AND SIMILARLY NAMED APPLIED SCIENCE PROGRAMS

Lead Society: American Society of Safety Engineers

These program criteria apply to safety, occupational safety, industrial safety, or similarly named applied science programs.

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

Program graduates must possess the necessary knowledge and skills to competently and ethically implement and practice applicable scientific, technical and regulatory aspects of the safety, health, and environmental profession. In addition, the program must demonstrate that graduates can apply college algebra, statistics, chemistry, physics, and human physiology/biology as it pertains to the practice of the safety, health, and environmental discipline. More specifically, graduates must be able to:

1. anticipate, recognize, evaluate, and develop control strategies for hazardous conditions and work practices;
2. demonstrate the application of business and risk management concepts;
3. demonstrate an understanding of the fundamental aspects of safety, industrial hygiene, environmental science, fire science, hazardous materials, emergency management, ergonomics and/or human factors;
4. design and evaluate safety, health, and/or environmental programs;
5. apply adult learning theory to safety training methodology;
6. identify and apply applicable standards, regulations, and codes;
7. conduct accident investigations and analyses;
8. apply principles of safety and health in a non-academic setting through an intern, cooperative, or supervised experience.

Faculty

This competence is evidenced by participation in professional societies, applicable certifications issued by nationally-accredited credentialing bodies, and/or extensive experience in the safety and health field. A faculty member must be identified as administratively in charge of the program.

II. PROGRAM CRITERIA FOR MASTER'S LEVEL PROGRAMS

Curriculum

Criteria for master's level safety and similarly named applied science programs are

inclusive of those for baccalaureate level applied science programs with the following additions: one year of study beyond the baccalaureate level and a project or research activity resulting in a report that demonstrates both mastery of the subject matter and a high level of oral and written communication skills. Graduates of a master's level safety program must also have demonstrated knowledge and competencies in the same subject areas defined in the baccalaureate program requirements.

Faculty

This competence is evidenced by participation in professional societies, applicable certifications issued by nationally-accredited credentialing bodies, and/or extensive experience in the safety and health field. A faculty member must be identified as administratively in charge of the program.

III. PROGRAM CRITERIA FOR TECHNICIAN LEVEL ASSOCIATE DEGREE PROGRAMS

Curriculum

Associate Safety Programs must demonstrate that graduates are able at the technician level to:

1. anticipate, recognize, and evaluate hazardous conditions and practices affecting people, property and the environment;
2. apply appropriate strategies designed to mitigate risk;
3. apply principles of safety and health in a non-academic setting through an intern, cooperative, or supervised experience.

Faculty

This competence is evidenced by participation in professional societies and applicable certifications issued by nationally-accredited credentialing bodies. A faculty member must be identified as administratively in charge of the program.

PROGRAM CRITERIA FOR SURVEYING, GEOMATICS AND SIMILARLY NAMED APPLIED SCIENCE PROGRAMS

Lead Society: National Society of Professional Surveyors
Cooperating Society: American Society of Civil Engineers

These program criteria apply to surveying, surveying and mapping, geomatics, or similarly named applied science programs.

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

Programs at the baccalaureate level must demonstrate that graduates have proficiency in one or more of the following areas: boundary and/or land surveying, geographic and/or land information systems, photogrammetry, mapping and geodesy, remote sensing, and other related areas.

Faculty

The program faculty must have responsibility and sufficient authority to define, revise, implement, and achieve program objectives. The program must demonstrate that faculty members are qualified to teach the subject matter by virtue of professional licensure or by education and/or professional experience.

II. PROGRAM CRITERIA FOR ASSOCIATE LEVEL PROGRAMS

Curriculum

Programs at the associate level must demonstrate that graduates have competency in one or more of the following areas: boundary and/or land surveying, geographic and/or land information systems, photogrammetry, mapping and geodesy, remote sensing, and other related areas.

Faculty

The program faculty must have responsibility and sufficient authority to define, revise, implement, and achieve program objectives. The program must demonstrate that faculty members are qualified to teach the subject matter by virtue of professional licensure or by education and/or professional experience.

IV. PROPOSED CHANGES TO THE CRITERIA

The following section presents proposed changes to these criteria as approved by the ABET Applied and Natural Science Area Delegation on October 20, 2017, on first reading. These are now published for a review and comment period. Comments will be considered until June 15, 2018. The ABET Applied and Natural Science Area Delegation will determine, based on the comments received and on the advice of the ANSAC, the content of any adopted criteria. These criteria will then become effective following the ABET Applied and Natural Science Area Delegation Meeting in the fall of 2018 and would first be implemented for accreditation reviews during the 2019-20 review cycle.

PROPOSED CHANGES TO CRITERION 3 AND CRITERION 5 OF THE CRITERIA FOR ACCREDITING APPLIED AND NATURAL SCIENCE PROGRAMS*

Definitions

While ABET recognizes and supports the prerogative of institutions to adopt and use the terminology of their choice, it is necessary for ABET volunteers and staff to have a consistent understanding of terminology. With that purpose in mind, the Commissions will use the following basic definitions:

Program Educational Objectives – Program educational objectives are broad statements that describe what graduates are expected to attain within a few years after graduation. Program educational objectives are based on the needs of the program's constituencies.

Student Outcomes – Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the program.

Assessment – Assessment is one or more processes that identify, collect, and prepare data to evaluate the attainment of student outcomes. Effective assessment uses relevant direct, indirect, quantitative and qualitative measures as appropriate to the outcome being measured. Appropriate sampling methods may be used as part of an assessment process.

Evaluation – Evaluation is one or more processes for interpreting the data and evidence accumulated through assessment processes. Evaluation determines the extent to which student outcomes are being attained. Evaluation results in decisions and actions regarding program improvement.

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

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.

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

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
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

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.

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.

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.

*Revised sections are underlined.

PROPOSED PROGRAM CRITERIA FOR ENVIRONMENTAL SCIENCE AND SIMILARLY NAMED PROGRAMS

Lead Society: American Academy of Environmental Engineers and Scientists

Curriculum

The program must prepare graduates to apply knowledge of chemistry, physics, biology, earth sciences, calculus, and statistics to understand the natural world and evaluate human impacts on the environment. Program graduates must understand the basic principles of sustainability, environmental ethics, economics, and the application of environmental science in policy formulation and environmental resources management.

Faculty

~~The program faculty must have the responsibility and sufficient authority to define, revise, and implement the program. The faculty must have appropriate education and experience to ensure proper guidance of the program.~~ A faculty member must be identified as being administratively in charge of the program.

Comments relative to the proposed criteria should be submitted by the link for comments available here and on the ACCREDITATION ALERTS section of the ABET website.

COMMENT: ANSAC General Criterion 3 & 5 >

https://www.surveymonkey.com/r/35appliednatural

COMMENT: ANSAC Proposed Program Criteria for Environmental Science and Similarly Named Programs >

https://www.surveymonkey.com/r/proposedenvironmentalscicriteria

Draft 3 and 5 Criteria Applied and Natural Science Accreditation Commission		
Current ASAC GENERAL CRITERION 3. STUDENT OUTCOMES	**Changes to current general criterion**	**Proposed ANSAC GENERAL CRITERION 3. STUDENT OUTCOMES**
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.	No edits or 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.
B. Associate degree programs must demonstrate that graduates have:	Reorganized to A. and edited	A. Associate degree program student outcomes must include, but are not limited to the following :
(a) an ability to apply knowledge of mathematics, sciences, and other related disciplines	Renumbered as Item 1, incorporated (e), edited per SASC	(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.
(b) an ability to conduct experiments, as well as to analyze and interpret data	Renumbered as Item 2 and edited per SASC	(2) An ability to conduct experiments or test theories, as well as to analyze and interpret data
(c) an ability to identify, formulate, and solve applied science problems	Combined with Item 1	See (1)
(d) an ability to function on teams	Renumbered as Item 3	(3) An ability to function on teams

(e) an understanding of professional and ethical responsibility	Renumbered as Item 4	(4) An understanding of professional and ethical responsibility
(f) an ability to communicate effectively	Renumbered as Item 5	(5) An ability to communicate effectively
(g) a recognition of the need for and an ability to engage in life-long learning	Moved to Curriculum	
(h) a knowledge of contemporary issues	Eliminated	
(i) an ability to use the techniques, skills, and modern applied science tools necessary for professional practice	Moved to curriculum	Now incorporated into Criterion 5, Paragraph 2, new item C
A. Baccalaureate degree programs must demonstrate that graduates have:	Reorganized and edited	B. Baccalaureate degree program student outcomes must include, but are not limited to the following:
(a) an ability to apply knowledge of mathematics, science, and applied sciences	Renumbered as Item 1 and incorporated (e) and SASC wording	(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.
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	Renumbered as Item 3 and edited with SASC wording	(3) an ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions
(c) an ability to formulate or design a system, process, or program to meet desired needs	Renumbered as Item 2 and edited with SASC wording	(2) An ability to formulate or design a system, process, procedure or program to meet desired needs.

(d) an ability to function on multidisciplinary teams	Renumbered as Item 6 and edited per Task Group	(6) An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.
(e) an ability to identify and solve applied science problems	Renumbered as Item 1,combined with (1), and edited	See (1) Above
(f) an understanding of professional and ethical responsibility	Renumbered as Item 5, combined with (h), and edited	(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.
(g) an ability to communicate effectively	Renumbered as Item 4 and edited per Task Group	(4) an ability to communicate effectively with a range of audiences
(h) the broad education necessary to understand the impact of solutions in a global and societal context	Combined with (f), and edited	(5) See Above
(i) a recognition of the need for and an ability to engage in life-long learning		Moved to curriculum 1st Paragraph
(j) a knowledge of contemporary issues		Eliminate
(k) an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.	Moved to curriculum	Now incorporated into Criterion 5, Paragraph 2, new item C

Current ASAC GENERAL CRITERION 5. CURRICULUM	Changes to current general criterion	Proposed ANSAC GENERAL CRITERION 5. CURRICULUM
The curriculum requirements specify subject areas appropriate to applied science programs but do not prescribe specific courses. 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.	Edited	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.
	New (NOTE – EAC has defined college level math differently. Definition of Natural Science is pulled in part from EAC and SASC document Definition of Applied Science is pulled from SASC document.	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.
The curriculum must include: a. a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the discipline b. applied science topics appropriate to the program c. a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.	Items a and b are edited per SASC. Item c is edited	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.
Students in baccalaureate degree programs must also be prepared for applied science practice through a	Edited per SASC and Task Group	Students in baccalaureate degree programs must also be prepared for practice in a field

curriculum culminating in comprehensive projects or experiences based on the cumulative knowledge and skills acquired in earlier course work.		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.