



Applied and Natural Science Accreditation Commission

CRITERIA FOR ACCREDITING
APPLIED AND NATURAL SCIENCE
PROGRAMS

Effective for Reviews during the 2022-2023 Accreditation Cycle
Incorporates all changes approved by the ABET Board of Delegates
Applied Science Area Delegation as of October 30, 2021

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Criteria for Accrediting Applied and Natural Science Programs
Effective for Reviews during the 2022-2023 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 Applied and Natural Science Accreditation Commission (ANSAC) of ABET recognizes that its constituents may consider certain terms to have certain meanings; however, it is necessary for the ANSAC to have consistent terminology. Thus the ANSAC will use the following definitions in applying the criteria.

College-level Mathematics – consists of mathematics that require 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 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. 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 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 program's continuous improvement actions. 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 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

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.

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 PROGRAMS**

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

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, (1) through (6). 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;
- (c) anticipation, identification, and evaluation of potentially hazardous agents, conditions and practices;
- (d) fundamental exposure assessment techniques (both qualitative and quantitative);
- (e) 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 ENVIRONMENTAL SCIENCE
AND SIMILARLY NAMED PROGRAMS**

Lead Society: American Academy of Environmental Engineers and Scientists

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

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

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

**PROGRAM CRITERIA FOR FACILITY MANAGEMENT
AND SIMILARLY NAMED PROGRAMS**

Lead Society: International Facility Management Association (IFMA)

I. PROGRAM CRITERIA FOR ASSOCIATE LEVEL PROGRAMS

Curriculum

- a. the history of the management of facilities, practice and profession.
- b. planning and managing projects.
- c. management of building systems, facility operations, occupant services and maintenance operations and real estate holdings,
- d. application of human factor principles to the facility operation and stakeholders

Faculty

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

II. PROGRAM CRITERIA FOR BACCALUREATE LEVEL PROGRAMS

Curriculum

- a. the history of managing facilities, practice and profession.
- b. planning and managing projects.
- c. management of building systems, facility operations, occupant services and maintenance operations and real estate holdings.
- d. assessment, management and leadership principles of facility organizations and their stakeholders
- e. applications of fiscal management tools to the facility program and organization.
- f. applications of human factor principles to the facility operation and stakeholders
- g. computer applications for facility management communications, asset and space management and problem solving.

Faculty

Faculty are expected to have facility management experience. A full-time faculty member must be identified as being administratively in charge of the program, and preferably be fulltime with the program.

III. PROGRAM CRITERIA FOR MASTER'S PROGRAMS

Admission Requirements

Admitted student must hold an earned baccalaureate degree that prepares 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.

Curriculum

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

A minimum of one year of study beyond the baccalaureate level facility management programs or facilities management related programs.

Faculty

Faculty are expected to have facility management industry experience. A full-time faculty member must be identified as being administratively in charge of the program, and preferably be full-time with the program.

**PROGRAM CRITERIA FOR
GEOLOGY, GEOLOGICAL SCIENCE
AND SIMILARLY NAMED PROGRAMS**

Lead Society: Society for Mining, Metallurgy, and Exploration (SME/AIME)

PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

The curriculum must provide graduates with the necessary knowledge of geology and include the following curricular areas:

- a) general (physical and historical) geology
- b) geospatial technology such as geographic information system (GIS) applications and/or remote sensing techniques
- c) applicable safety practices in laboratory and field work
- d) mineralogy, petrology, and geochemistry
- e) sedimentology, stratigraphy, and paleontology
- f) geomorphology, surficial processes, and Quaternary geology
- g) structural geology, tectonics, and geophysics
- h) one or more applied areas, such as: Hydrogeology, engineering geology or petroleum, mining, economic or other resources geology
- i) fundamentals of geological field work, including field procedures, use of basic tools and instruments, recognition of lithologies and structural features in natural settings, data collection, and mapping or other means of visualizing geological data and processes

**PROGRAM CRITERIA FOR
HEALTH PHYSICS
AND SIMILARLY NAMED PROGRAMS**
Lead Society: American Industrial Hygiene Association
Cooperating Society: American Nuclear Society

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:

- (g) A minimum of one year of study beyond the basic-level, consisting of courses with increased depth and rigor;
- (h) 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;
- (i) An adequate foundation in statistics, applied sciences, and/or related professional practice; and,
- (j) Advanced qualitative and quantitative problem-solving skills.
- (k) 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 PROGRAMS**

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

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

The curriculum must provide graduates with the necessary knowledge of Industrial Hygiene and include the following curricular areas:

- (a) physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and/or stressors with the human body;
- (b) anticipation, recognition, evaluation, and control of potentially hazardous agents, conditions and practices;
- (c) fundamental exposure assessment techniques (both qualitative and quantitative);
- (d) industrial hygiene data interpretation including statistical and epidemiological principles;
- (e) applicable business and managerial practices;
- (f) occupational and environmental standards and regulations;
- (g) fundamental aspects of safety and environmental health.

Baccalaureate-level Faculty

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. Core Industrial Hygiene faculty pertains to those who are teaching industrial hygiene courses.

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

II. PROGRAM CRITERIA FOR MASTER'S LEVEL PROGRAMS

Admission Requirements

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

PROGRAM CRITERIA FOR SAFETY AND SIMILARLY NAMED PROGRAMS

Lead Society: American Society of Safety Professionals

I. PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

The curricular areas of safety must include the following:

- (a) Anticipation recognition, evaluation, and control of hazards and exposures impacting people, property and the environment
- (b) Principles and practices of risk management and business justification
- (c) Development of policies, procedures, and systems using research and evidence-based data
- (d) Legal principles relevant to safety profession
- (e) Root cause analysis, incident investigation, and acceptable risk causation and relative risk
- (f) Safety data analysis, interpretation and utilization of statistical and epidemiological principles; and trends of injuries, illnesses and workplace incidents
- (g) Principles and practices of continuous quality improvement and sustainable safety programs and management systems
- (h) Applications of adult learning theory and behavior change to safety and health training methodology
- (i) Leadership and organizational behavior
- (j) Culminating senior project/capstone

Faculty

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

Faculty 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.

II. PROGRAM CRITERIA FOR MASTER'S LEVEL PROGRAMS

Admission Requirements

Programs must comply with graduate admission requirements of the institution. Admitted students must hold an earned baccalaureate degree that included basic principles of college-level mathematics and basic science appropriate to the discipline.

Exceptions may be considered with an individually documented plan of study to address remedial course work.

Curriculum

Program criteria for master's level programs require a minimum of one year of study beyond the basic level, including advanced qualitative and quantitative problem-solving and decision-making skills.

Faculty

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

Faculty competence is evidenced by participation in professional societies, applicable certifications issued by nationally accredited credentialing bodies, and or extensive experience in the safety health field.

III. PROGRAM CRITERIA FOR ASSOCIATE DEGREE PROGRAMS

Curriculum

Associate degrees in occupational safety and health can either prepare graduates for entry-level technical positions or become gateways in the safety profession (or related professions) by matriculating to a four-year degree program. In this way, associate degree curriculum areas of OSH must include the following:

1. Anticipation, recognition, evaluation, and control of hazards and exposures impacting people, property and the environment
2. Appropriate data-based strategies designed to mitigate identified safety risks
3. Principles of occupational safety and health in a non-academic setting through an intern, cooperative, or other supervised experience.

Faculty

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

Faculty competence is evidenced by participation in professional societies, applicable certifications issued by nationally accredited credentialing bodies, and/or extensive experience in the safety health field.

**PROGRAM CRITERIA FOR SURVEYING, GEOMATICS
AND SIMILARLY NAMED PROGRAMS**

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

I. PROGRAM CRITERIA FOR ASSOCIATE LEVEL PROGRAMS

Curriculum

The curriculum must prepare associate degree graduates with the knowledge, techniques and skills in the application of surveying/geomatics. Graduates of associate degree surveying/geomatics programs possess a foundation in plane and geodetic science, professional land surveying, property law, and mapping and are prepared to use modern equipment and techniques to construct or locate products through the surveying/geomatics workflow.

The curriculum must contain the following curricular areas:

- a. Sufficient application of the mathematical concepts to execute basic surveying/geomatics analysis,
- b. Basic historical knowledge of land ownership to demonstrate where surveying/geomatics are an integral part,
- c. Summary of data science analysis for conformance of precision/accuracy and blunders/errors detection,
- d. Mastery of modern measurement equipment applied to construct or locate features above, below or on the Earth's surface,
- e. Basic communications that include oral, graphical and electronic forms,
- f. Added depth in a minimum of three subject areas chosen from:
 1. boundary surveying,
 2. property law,
 3. route surveying,
 4. construction surveying,
 5. mapping,
 6. geodetic science

II. PROGRAM CRITERIA FOR BACCALUAREATE LEVEL PROGRAMS

Curriculum

The curriculum must prepare baccalaureate degree graduates with the knowledge, techniques and skills in the Art and Science of surveying/geomatics to be licensed or certified professionals. Graduates of baccalaureate degree in surveying/geomatics possess an exemplary foundation in geodetic science, photogrammetry and remote sensing, professional land surveying, mapping and cartography, geospatial data

science, land information systems, legal aspects of spatial data, and are prepared to select modern equipment and techniques to design, construct or locate products through the surveying /geomatics workflow.

The curriculum must include:

- g. Mathematical concepts, including statistics, to support analyses of complex surveying/geomatics problems,
- h. Historical and legal elements of land ownership where surveying/geomatics are an integral part,
- i. Data science and analysis for conformance of precision/accuracy and blunder/error detection,
- j. Data structure/format, storage/management, publication/visualization, and the related legal responsibilities to the public,
- k. Modern measurement and design technologies necessary to model, locate or construct features above, below or on the Earth's surface,
- l. Added depth in a minimum of three subject areas, consistent with the program's educational objectives, chosen from the following:
 - 1. boundary surveying,
 - 2. engineering surveys,
 - 3. photogrammetry and remote sensing,
 - 4. geodesy and geodetic surveying,
 - 5. mapping including map projections and coordinate systems,
 - 6. geospatial data science.

IV. PROPOSED CHANGES TO THE CRITERIA

The following sections present proposed changes to these criteria as approved by the ABET Applied Science and Natural Science Area Delegation on October 30, 2021 for a 180 day review and comment period. Comments will be considered until June 15th, 2022. The ABET Applied and Natural Science Commission will determine, based on the comments received and on the advice of the ANSAC, the content of the adopted criteria. The adopted criteria will then become effective following the ABET Engineering Area Delegation meeting in the fall of 2022 and would first be applied by the ANSAC for accreditation reviews during the 2023-2024 accreditation review cycle.

ANSAC GENERAL CRITERIA FOR BACCALAUREATE AND ASSOCIATE DEGREE PROGRAMS

Criterion 5. Curriculum

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.

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.
- (d) **a component that promotes inclusion, diversity, and equity awareness for success in the profession.**

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.

PROPOSED PROGRAM CRITERIA FOR CONSTRUCTION MANAGEMENT AND SIMILARLY-NAMED PROGRAMS

Lead Society: Construction Management Association of America

Applicability

These program criteria apply to Baccalaureate ~~level Construction Management Level construction management~~ programs and similarly named applied science programs.

Curriculum

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

1. Construction project management from pre-design through ~~commissioning.~~;
2. ~~Risk management including identification, analysis, project life-cycle and mitigation.~~
3. ~~Cost estimating including types, levels, and accuracy.~~
4. ~~Financial management including budgeting, cost control, and forecasting.~~
5. ~~Schedule management including development, forecasting, and planning.~~
6. ~~Contract administration, legal requirements, and delivery methods.~~
27. ~~Project life cycle and sustainability including materials and methods of construction.;~~
- ~~8.~~ ~~Construction systems and constructability analyses.~~
- ~~9.~~ ~~Leadership including business, communication skills, and behavioral awareness.~~
- ~~10.~~ ~~Labor and workforce planning and management.~~
- 3.11. ~~Construction~~ health and safety, accident prevention, and regulatory compliance.
- ~~4-12.~~ ~~Advancements in law, contract documents administration, and dispute prevention and resolution; materials, labor and methods of construction technology.; and accounting principles;~~
- ~~7.~~ ~~planning and scheduling;~~
- ~~6.~~ ~~finance~~
- ~~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 curriculum ~~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 ~~each 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.

**PROGRAM CRITERIA FOR DATA SCIENCE, DATA ANALYTICS,
AND SIMILARLY NAMED PROGRAMS**
Lead Society: CSAB

PROGRAM CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

Curriculum

The curriculum must provide graduates with the knowledge and skills to be able to apply theory, techniques, and tools throughout the data science lifecycle and to employ the results to satisfy stakeholders' needs. The curriculum must include:

1. Fundamental data science lifecycle topics:
 - a) Data acquisition and representativeness
 - b) Data management
 - c) Data preparation and integration
 - d) Data analysis
 - e) Model development and deployment
 - f) Visualization and communication of the knowledge obtained from the data
2. Concepts that span and are applied to the data science lifecycle:
 - a) Data ethics including legitimate use and algorithmic fairness
 - b) Governance including privacy, security, and stewardship
 - c) Statistical and mathematical topics including inference, modeling, linear algebra, probability, and optimization
 - d) Computing including data structures and algorithms
3. Advanced data science coursework that provides depth.
4. Coverage of at least one application area that provides context for data science activities.
5. A comprehensive project or experience that incorporates an application area and requires integration and application of knowledge and skills acquired in earlier course work.

Faculty

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