Criteria for Accrediting Undergraduate Programs

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GENERAL CRITERIA

These criteria are intended to assure quality and to foster the systematic pursuit of improvement in the quality of engineering education that fulfils the needs of constituencies in a dynamic and competitive environment. It is the responsibility of the institution seeking accreditation of a program to demonstrate clearly that the program meets the following criteria.

Criterion 1. Students

The program must monitor and evaluate the performance of the students throughout the training, offer the necessary and constant support to achieve the expected progress, foster success in attaining the student outcomes, thereby enabling graduates to attain program educational objectives.

Students must be advised regarding curriculum, career development and job placement in a structured way.

The program must have and enforce policies for: (a) accepting both new and transfer students, (b) awarding appropriate academic credit for courses taken at other institutions, and (c) develop pre-professional practices.

The admission process to the program must establish criteria in accordance with the entry profile, clearly specified in the prospectuses, which are public knowledge.

The program must design, execute and maintain mechanisms for the leveling of students for the beginning of their studies.

The program must have and enforce procedures to ensure and document that students who graduate meet all graduation requirements.

The program must maintain and make use of agreements with higher education institutions in the country and abroad for the mobility of students and teachers, as well as for the exchange of experiences.

Criterion 2. Program Educational Objectives and follow-up to graduates

Program educational objectives must be public and consistent with the mission of the institution, the needs of the program's various constituencies, and these criteria.

There must be a documented and effective process for the establishment and the periodic review of these program educational objectives, involving program constituencies. This review must be systematically utilized to ensure they remain consistent with the institutional mission, the program's constituencies' needs, and these criteria.

The program must keep an up-to-date record of its graduates, establish a permanent link and monitor their job placement.

Criterion 3. Student Outcomes

The program must have documented student outcomes that prepare graduates to attain the program educational objectives.

The program must design appropriate processes and tools for the assessment of student outcomes.

The program must allow students to achieve, at the time of graduation:

- For Architecture Programs:

  [RE-A01] Understand the relationship between people and buildings, and between buildings and their environment, as well as the need to relate buildings and spaces between them with scale and human needs.

[RE-A02] Understand the profession of architecture and the role of the architect in society, particularly in the preparation of reports that take into account social, cultural, environmental, risk and resilience factors.
[RE-A03] Understand research methods and prepare the report for a design project.
[RE-A04] Create architectural designs that meet aesthetic and technical requirements.
[RE-A05] Understand structural and environmental design issues for construction and engineering associated with building design.
[RE-A06] Demonstrate adequate knowledge of physical problems and technologies, as well as of the function of buildings to provide internal conditions of comfort and protection within environmental parameters.
[RE-A07] Have the design skills necessary to satisfy the requirements of the building users within the constraints imposed by cost factors and construction regulations.
[RE-A08] Is aware of the responsibilities towards human, social, cultural, urban, architectural and environmental values, as well as architectural heritage.
[RE-A09] Demonstrate adequate knowledge of the means to achieve ecologically responsible design and environmental conservation and rehabilitation.
[RE-A10] Have the creative capacity in construction techniques, founded on a comprehensive understanding of the disciplines and construction methods related to architecture.
[RE-A11] Demonstrate adequate knowledge of project financing and management, as well as cost control and project execution methods.
[RE-A12] Recognize the need for lifelong learning and address it in the broader context of technological change.
[RE-A13] Apply knowledge of mathematics, natural sciences and information technologies in architectural-urban solutions and interior design.
[RE-A14] Communicate effectively in graphic, oral and written form.
[RE-A15] Function effectively as an individual, and as a member or leader of diverse team.

- For Science Programs:

  [RE-Ci01] Investigative Action: Solve and unfold in scientific research problems and tasks.
  [RE-Ci02] Impact on Society: Understand and demonstrate the impact of solutions in a global, economic, environmental and social context.
  [RE-Ci03] Ethics: Demonstrate ethical principles and is committed to the responsibilities of the profession, according to the current regulations of each institution.
  [RE-Ci04] Individual and Team Work: Function effectively as an individual, and as a member or leader of diverse teams [5], achieving results under collaborative actions.
  [RE-Ci05] Communication: Communicate effectively, by understanding and writing reports, making presentations and transmitting and receiving clear instructions, in Spanish and specialized basic English.
  [RE-Ci06] Project Management: Demonstrate knowledge and understanding of the principles of R+D+i and production project management, and their respective execution in accordance with copyright and intellectual property standards.
  [RE-Ci07] Lifelong Learning: Develop their autonomous learning continuously and strategically, and face it in the broader context of technological changes.

- For Computing Programs:

  [RE-C01] Computer Knowledge: Apply knowledge of mathematics, science and computing appropriate to the solution of defined problems and their requirements in the discipline of the program.
  [RE-C02] Problem Analysis: Identify, formulate, research literature and solve complex computing problems and other relevant disciplines in the domain.

[RE-C03] Design and Development of Solutions: Design, implement and evaluate solutions to complex computing problems and design and evaluate systems, components or processes that satisfy specific needs.
[RE-C04] Use of Modern Tools: Create, select, adapt and apply modern techniques, resources and tools for the practice of computing and understand their limitations.
[RE-C05] Individual and Team Work: Function effectively as an individual, as a member or leader of diverse teams.
[RE-C06] Communication: Communicate effectively orally and in writing, in a variety of professional contexts.
[RE-C07] Professionalism and Society: Analyze and assess the local and global impact of computing on people, organizations and society.
[RE-C08] Ethics: Understand and commit to ethics, professional responsibilities, and standards of professional computing practice.
[RE-C09] Continuous Learning: Recognize the need and have the ability to engage in autonomous learning for continuous professional development.

- For Engineering Programs:

  [RE-I01] Engineering knowledge: Apply knowledge of mathematics, science, and engineering to the solution of complex engineering problems.
  [RE-I02] Problem analysis: Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
  [RE-I03] Design and development of solutions: Design solutions for complex engineering problems and design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, and sustainability.
  [RE-I04] Investigation: Conduct investigations of complex engineering problems using research-based knowledge and research methods including design and conduct of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
  [RE-I05] Modern tool usage: Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling, with an understanding of the limitations
  [RE-I06] Engineering and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
  [RE-I07] Environment and sustainability: Understand and evaluate the sustainability and the impact of solution of complex engineering problems in a global, economic, environmental, and social context.

  [RE-I08] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

  [RE-I09] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

  [RE-I10] Communication: Communicate effectively, by understanding and writing reports and design documentation, making presentations, and giving and receiving clear instructions.

  [RE-I11] Project Management: Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply it.

  [RE-I12] Lifelong learning: Recognize the need for, and engage in independent and life-long learning in the broadest context of technological change.

- For Engineering Technology Programs:

  [RE-T01] Engineering Knowledge: Apply knowledge of mathematics, science, engineering and technology in applied engineering procedures, systems or methodologies.

  [RE-T02] Problem Analysis: Identify, formulate, investigate and analyze broadly-defined engineering problems.

  [RE-T03] Design and Development of Solutions: Design solutions for broadly-defined engineering problems and contribute to the design of systems, components or processes to satisfy desired needs within realistic restrictions in the aspects of public health and safety, cultural, social and environmental.

  [RE-T04] Research: Conduct studies of broadly-defined engineering problems; locate, searche, and select pertinent information in codes and databases, and design and conduct experiments to produce valid conclusions.

  [RE-T05] Use of Modern Tools: Select and use modern techniques, resources and tools from engineering and information technologies in broadly-defined engineering problems, with an understanding of the limitations.

  [RE-T06] Professionalism and Society: Include social, health, safety, legal and cultural issues and the consequent responsibilities relevant to the practice of technology in engineering.

  [RE-T07] Environment and Sustainability: Understands and assess the sustainability and impact of engineering technology solutions in a social, health, safety, legal, cultural and environmental context.

  [RE-T08] Ethics: Understand and commit to professional ethics and the responsibilities and standards of engineering technologists.

  [RE-T09] Individual and Team Work: Function effectively as an individual and as a member or leader of a technical team.

  [RE-T10] Communication: Communicate effectively, by understanding and writing reports and design documentation, making presentations, and transmitting and receiving clear instructions.

  [RE-T11] Project Management: Understand and apply the basic principles of project management.

  [RE-T12] Lifelong Learning: Recognize the need for lifelong professional development and address it.

Criterion 4. Continuous Improvement

The program must have a quality assurance system in place.

The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes and program educational objectives 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.

The program must define, implement and monitor improvement plans for the aspects that have been identified and prioritized as opportunities for improvement in a participatory manner.

Criterion 5. Curriculum

The program must ensure consistency of the curriculum with the student outcomes, program educational objectives and the mission of institution.

The curriculum must include at least:

- For Architecture Programs:

  [P-A01] Adequate knowledge of the history and theories of architecture, as well as the arts, technologies, materials and related human sciences.

  [P-A02] The knowledge of fine arts as a reference in the quality of architectural design.

  [P-A03] Adequate knowledge of urban design, planning, and techniques involved in the land and landscape planning process.

  [P-A04] Adequate knowledge of the industries, organizations, regulations and procedures involved in translating building design concepts and integrating plans into general planning.

- For Computing Programs:

  [P-C01] One year of fundamental and advanced computer topics that provide breadth and depth in the discipline of the program.

  [P-C02] Discipline appropriate university level mathematics.

  [P-C03] A general education component that complements the technical content of the curriculum, and is consistent with the objectives of the program and the institution.

  [P-C04] For each specialty course required for all students, its content, expected performance criteria, and placement within the syllabus must be published.

- For Engineering Programs:

  [P-I01] one year of a combination of university level mathematics and basic sciences (some with experimental experience) appropriate to the discipline.

  [P-I02] one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study.

  [P-I03] a general education component that complements the technical content of the curriculum and is consistent with the program educational objectives and the institution.

  [P-I04] Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

- For Engineering Technology Programs:

  [P-T01] Mathematics - Programs that train engineering technologists will include the application of differential and integral calculus, or other mathematics above the level of algebra and trigonometry appropriate to the student outcomes and the program educational objectives.

  [P-T02] Technical content - Technical content should focus on applied aspects of science and engineering and should:

  (a) Represent at least 1/3 of the total number of credits; but not more than 2/3 of the total program credits,

  (b) Include a technical core that prepares students for the increasingly complex technical specialties that they will experience later in the curriculum,

  (c) Develop the competence of students in the use of equipment and tools common to the discipline.

  [P-T03] Physical and Natural Sciences - The basic science content of the program must include physical or natural science with laboratory experiences as appropriate for the discipline.

  [P-T04] Content integration - The program must provide a final or integrative experience that develops students' competencies in the application of technical and non-technical skills in problem solving.

  [P-T05] Training experiences in real work situations - Credits based on training experiences in real work situations or other similar ones must include an appropriate academic component evaluated by the faculty of the program.

  One year is equivalent to 40 credits from the Peruvian educational system.

Criterion 6. Faculty

Each professor dedicated to teaching in the program must have professional experience and academic background consistent with their expected contributions to the program.

The competence of the faculty must be demonstrated based on factors, such as: academic training, professional experience, training and certifications, contributions to the discipline, teaching experience and effectiveness, communication skills, development of more effective programs, and participation in professional societies. Taken together, the faculty must possess the breadth and depth to cover all areas of the program's curriculum.

There must be sufficient faculty to allow adequate levels of: (a) ainteraction between students and teachers, (b) student advising and counseling, (c) service activities of the educational institution, and (d) interactions with industrial and professional practitioners, as well as employers of students.

The program must ensure the development, professional updating and strengthening of the teaching capacities of the faculty.

The program faculty must have and demonstrate sufficient authority to ensure the proper guidance of the program and to develop and implement processes for the evaluation, assessment, and continuing improvement of the program.

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 safe and propper use of the tools, equipment, computing resources, and laboratories available to the program.

Information and reference centers and computing and communications infrastructure must be adequate and up-to-date to support the academic and professional activities of students and the faculty.

The program must have access to information and reference centers, according to the needs of students and teachers, available at the institution, managed through a program of continuous updating and improvement.

The program must have an integrated information and accessible communication system in place, to support academic management, R+D+i+e and administrative management.

The program must ensure that students, teachers, and administrative staff have access to wellness services to improve their performance and training, as well as evaluate the impact of such services.

Criterion 8. Institutional Support

Institutional support and leadership from top management 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 acquire, maintain, and operate infrastructures, facilities, and equipment appropriate for the program, and to provide an environment in which student outcomes can be attained.

The resources available to the program must be sufficient to attract, retain, and provide for the continued

professional development of a qualified faculty.

The program must manage the financial resources necessary for its operation, strengthening and sustainability over time.

PROGRAM CRITERIA

Each program must meet applicable Program Criteria (if any). Program Criteria provide the specificity needed for interpretation of the baccalaureate level criteria as applicable to a given discipline. Requirements stipulated in the Program Criteria are limited to the student outcomes, curriculum and faculty. If a program, by virtue of its title, becomes subject to two or more sets of Program Criteria, then that program must meet each set of Program Criteria; however, overlapping requirements need to be met only once.

Criterion 9. Specific Criteria

- For Science Programs:

PROGRAM CRITERIA FOR PROGRAMS OF
PHYSICS
AND OTHER PROGRAMS OF SIMILAR DENOMINATION

These criteria apply to science programs that include "physics" or similar modifiers in their names.

Student Outcomes.

The program must allow students to achieve, upon graduation:

[RE-Ci08] The ability to apply mathematical knowledge and methods in solving physics problems.

[RE-Ci09] The understanding of the fundamental principles of physics, their inherent relationship and mathematical formulation, and the appropriate methods for the theoretical analysis, modeling and simulation of relevant processes.

[RE-Ci10] The ability to classify interdisciplinary problems based on physics, and analyze and / or solve them using natural scientific and mathematical methods.

[RE-Ci11] The ability to apply modern physical measurement methods and evaluate the results.

Curriculum

The curriculum must include at least:

[P-Ci01] Fundamental knowledge of mathematics and natural sciences relevant to physics.
[P-Ci02] Solid knowledge of classical physics (mechanics, electrodynamics, thermodynamics, vibrations, waves and optics) and the fundamentals of quantum, atomic and molecular, nuclear, elementary particle and solid-state physics.
[P-Ci03] Knowledge of safety and environmental issues and legal foundations.
[P-Ci04] Topics that address a humanistic, scientific and technological training.

PROGRAM CRITERIA FOR PROGRAMS OF MATHEMATHICS AND OTHER PROGRAMS OF SIMILAR DENOMINATION

These criteria apply to science programs that include “math” or similar modifiers in their names.

Student Outcomes.

The program must allow students to achieve, upon graduation:

[RE-Ci08] The ability to identify and generalize mathematical problems.

[RE-Ci09] The ability to use mathematical sentences to solve mathematical problems.

[RE-Ci10] The ability to formulate mathematical hypotheses.

[RE-Ci11] The ability to recognize the formal structure of mathematical problems.

[RE-Ci12] The ability to formally and correctly prove mathematical statements using various methods.

[RE-Ci13] Mastering strategies to transfer methods in the area of mathematics.

[RE-Ci14] The ability to implement mathematical processes in the computer.

Curriculum

The curriculum must include at least:

[P-Ci01] A thorough understanding of the fundamentals of abstract and applied mathematics, including algebra, calculus, analysis, topology, differential equations, geometry, and computation.

[P-Ci02] Knowledge of safety, environment and legal fundamentals.

[P-Ci03] Topics that address a humanistic, scientific and technological training.

PROGRAM CRITERIA FOR PROGRAMS OF CHEMISTRY AND OTHER PROGRAMS OF SIMILAR DENOMINATION

These criteria apply to science programs that include "chemistry" or similar modifiers in their names.

Student Outcomes.

The program must allow students to achieve, upon graduation:

[RE-Ci08] The ability to perform hands-on chemistry work and handle chemicals independently and safely in laboratory practice.

[RE-Ci09] Methodological competence in chemistry and the ability to apply it in other contexts.

[RE-Ci10] The ability to obtain, interpret and evaluate data of scientific and technical relevance, and draw solid conclusions that take into account scientific, technological and ethical findings.

Curriculum

The curriculum must include at least:

[P-Ci01] Fundamental knowledge of mathematics and physics relevant to chemistry.

[P-Ci02] Solid knowledge of chemistry topics, including inorganic, organic and physico-chemical chemistry, as well as analytical chemistry.

[P-Ci03] Knowledge in natural sciences, humanities or other related areas for chemistry.

[P-Ci04] Knowledge of safety and environmental issues and legal foundations.

[P-Ci05] Topics that address a humanistic, scientific and technological training.

- For Computing Programs:

PROGRAM CRITERIA FOR PROGRAMS OF COMPUTER SCIENCE AND OTHER PROGRAMS OF SIMILAR DENOMINATION

These criteria apply to computer programs that include "computer science" or similar modifiers in their names.

Student Outcomes.

The program must allow students to achieve, upon graduation:

[RE-C10] The ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates an understanding of the trade-offs involved in design options.

[RE-C11] The ability to apply design and development principles in the construction of software systems of varying complexity.

Curriculum

The curriculum must include at least:

[P-C05] Computer Science: One year and a third that must include:

1. Fundamentals of algorithms, data structure, software design, concepts of programming languages and computer organization and architecture.

2. Exposure to a variety of programming languages and systems.

3. Proficiency in at least one high-level language.

4. Advanced courses that deepen the knowledge acquired in the basic courses.

[P-C06] One year of science and math:

1. Science: A science component that develops an understanding of the scientific method and provides students with the opportunity to experience this mode of inquiry in science or engineering specialty courses that provide some degree of exposure to laboratory work.

2. Mathematics: At least half a year that must include discrete mathematics. The rest of mathematics may consist of courses in areas such as calculus, linear algebra, numerical methods, probability, statistics, number theory, geometry, or symbolic logic.

Faculty.

Some full-time professors must have a postgraduate degree in computer science.

PROGRAM CRITERIA FOR PROGRAMS OF INFORMATION SYSTEMS AND OTHER PROGRAMS OF SIMILAR DENOMINATION

These criteria apply to computer programs that include "information systems" or similar modifiers in their names.

Student Outcomes.

The program must allow students to achieve, upon graduation:

[RE-C10] The understanding and ability to support the use, execution and management of information systems within an application environment.

Curriculum.

The curriculum must include at least:

[P-C05] Information Systems: One year that must include:

1. Basic coverage of the fundamentals of application development, data management, data networks and communications, information systems security, systems analysis and design, and the role of Information Systems in organizations.

2. Advanced courses that deepen the knowledge acquired in the basic courses.

[P-C06] Information Systems Environment: Half a year of courses that must include a cohesive set of topics that allow the understanding of an environment in which information systems will be applied professionally.

[P-C07] Quantitative analysis or methods, including statistics or operations research.

Faculty.
Some full-time professors, including those responsible for developing the Information Systems curriculum, are required to hold a postgraduate degree in information systems or its equivalent.

PROGRAM CRITERIA FOR PROGRAMS OF INFORMATION TECHNOLOGIES AND OTHER PROGRAMS OF SIMILAR DENOMINATION

These criteria apply to computer programs that include "information technology" or similar modifiers in their names.

Student Outcomes.

The program must allow students to achieve, upon graduation:

[RE-C10] The ability to use and apply current concepts and practices in basic information technologies.

[RE-C11] The ability to identify and analyze user needs and take them into account in the selection, creation, evaluation and administration of computer-based systems.

[RE-C12] The ability to effectively integrate solutions based on information technology in user environments.

[RE-C13] Understanding the best practices and standards in their applications.

[RE-C14] The ability to assist in the creation of an effective project plan.

Curriculum.

The curriculum must include at least:

[P-C05] Fundamental's coverage of:

1. Basic information technologies of human-computer interaction, information management, programming, networks, systems and web technologies.
2. Information security and assurance.
3. Administration and maintenance of systems.
4. Systems integration and architecture.

[P-C06] Advanced courses that deepen the knowledge acquired in the basic courses.

Faculty.

Some full-time professors must have a postgraduate degree in information technology or the equivalent.

- For Engineering Programs:

PROGRAM CRITERIA FOR
AGRICULTURAL ENGINEERING, AGROINDUSTRIAL, AGRONOMICS, FORESTRY,
AND OTHER PROGRAMS OF SIMILARS NAME

These program criteria apply to engineering programs that include "agricultural," "agribusiness", "agronomics", "forestry," or similar modifiers in their titles.

Curriculum
The curriculum must include mathematics through differential equations and biological and engineering sciences consistent with the program educational objectives.

The curriculum must prepare graduates to apply engineering to agriculture, aquaculture, forestry, human, or natural resources.

Faculty

The program will demonstrate that those faculty members teaching courses that are primarily design in content are qualified to teach the subject matter by virtue of education and experience or professional licensure.

PROGRAM CRITERIA FOR
BIOLOGICAL ENGINEERING
AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs that include "biological," "biological systems," "food," or similar modifiers in their titles with the exception of bioengineering and biomedical engineering programs.

Curriculum
The curriculum must include mathematics through differential equations, a thorough grounding in chemistry and biology and a working knowledge of advanced biological sciences consistent with the program educational objectives.

The curriculum must prepare graduates to apply engineering to biological systems.

Faculty

The program will demonstrate that those faculty members teaching courses that are primarily design in content are qualified to teach the subject matter by virtue of education and experience or professional licensure.

PROGRAM CRITERIA FOR ENVIRONMENTAL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs including "environmental", "sanitary," or similar modifiers in their titles.

Curriculum

The curriculum must prepare graduates to apply knowledge of mathematics through differential equations, probability and statistics, calculus-based physics, chemistry (including stoichiometry, equilibrium, and kinetics), an earth science, a biological science and fluid mechanics.

The curriculum must prepare graduates to: (1) formulate material and energy balances, and analyze the fate and transport of substances in and between air, water, and soil phases; (2) conduct laboratory experiments and analyze and interpret the resulting data in more than one major environmental engineering focus area, (e.g., air, water, land, environmental health); (3) design environmental engineering systems that include considerations of risk, uncertainty, sustainability, life-cycle principles, and environmental impacts; and (4) apply advanced principles and practice relevant to the program objectives.

The curriculum must prepare graduates to understand concepts of professional practice, project management, and the roles and responsibilities of public institutions and private organizations pertaining to environmental policy and regulations.

Faculty

The program must demonstrate that a majority of those faculty teaching courses that are primarily design in content are qualified to teach the subject matter by virtue of professional licensure, board certification in environmental engineering, or by education and equivalent design experience.

PROGRAM CRITERIA FOR BIOMEDICAL ENGINEERING, BIOENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs including "biomedical", "bioengineering," or similar modifiers in their titles.

Curriculum

The curriculum structure must provide breadth and depth across the full range of science and engineering topics consistent with program educational objectives and student outcomes.

The curriculum should prepare graduates to: (1) apply principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations), and statistics; (2) solve biomedical engineering or bioengineering problems including those associated with the interaction between living and non-living systems; (3) analyze, model, design and carry out biomedical engineering or bioengineering devices, systems, components or processes; (4) perform measurements and interpret data obtained in living systems.

PROGRAM CRITERIA FOR CIVIL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs including "civil" and similar modifiers in their titles.

Curriculum

The program must prepare graduates to: (1) apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of basic science; (2) apply probability and statistics to address uncertainty; (3) analyze and resolve problems of at least four technical areas appropriate to civil engineering; (4) conduct civil engineering experiments and analyze and interpret the resulting data; (5) design a system, component, or process in more than one civil engineering context; (6) include the principles of sustainability in design; (7) explain basic concepts in management, business, public policy, and leadership; (8) analyze professional ethics issues and (9) and explain the importance of professional licensure.

Faculty

The program must demonstrate that faculty teaching courses that are primarily design in content are qualified to teach the subject matter by virtue of professional licensure, or by education and design experience.

The program must demonstrate that it is not critically dependent on one individual.

PROGRAM CRITERIA FOR ELECTRICAL, ELECTRONIC, TELECOMMUNICATION ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs that include “electrical”, “electronic”, “communications”, “telecommunications”, “computers” or similar modifiers in their titles.

Curriculum

The curriculum must provide breadth and depth in the full range of engineering topics involved in the name of the program.

The curriculum must include: (1) probability and statistics, including appropriate applications for program name; (2) mathematics through differential and integral calculus; (3) science (defined as biological, chemical, or physical science); (4) engineering topics (including computer science) necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components.

The curriculum for programs that include the modifiers "electrical," "electronics," "communications," or "telecommunications" in their name should include advanced mathematics such as differential equations, linear algebra, complex variables, and discrete mathematics.

The curriculum of programs that include the modifier "computers" in their name must include discrete mathematics.

The curriculum of programs that include the modifier “communications” or “telecommunications” in their name should include topics in communications theory and systems.

The curriculum of programs that include the modifier “telecommunications” in their name must include topics on the design and operation of telecommunications networks for voice, data, image and video transmission services.

PROGRAM CRITERIA FOR GEOLOGICAL, GEOPHYSICS ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs that include “geophysics”, "geological" and similar modifiers in their titles.

Curriculum

The program must prepare graduates to have: (1) the ability to apply mathematics including differential equations, calculus-based physics, and chemistry, to geological engineering problems; (2) proficiency in geological science topics that emphasize geologic processes and the identification of minerals and rocks; (3) the ability to visualize and solve geological problems in three and four dimensions; (4) proficiency in the engineering sciences including statics, properties/strength of materials, and geomechanics; (5) the ability to apply principles of geology, elements of geophysics, geological and engineering field methods; and
(6) engineering knowledge to design solutions to geological engineering problems, which will include one or more of the following considerations: the distribution of physical and chemical properties of earth materials, including surface water, ground water (hydrogeology), and fluid hydrocarbons; the effects of surface and near-surface natural processes; the impacts of construction projects; the impacts of exploration, development, and extraction of natural resources, and consequent remediation; disposal of wastes; and other activities of society on these materials and processes, as appropriate to the program objectives.

Faculty

Evidence must be provided that the program’s faculty members understand professional engineering practice and maintain currency in their respective professional areas.

The program’s faculty must have responsibility and authority to define, revise, implement, and achieve program objectives.

PROGRAM CRITERIA FOR ENGINEERING MANAGEMENT AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs using “management” or similar modifiers in their titles.

Curriculum

The curriculum must prepare graduates to: (1) understand the engineering relationships between the management tasks of planning, organization, leadership, control, and the human element in production, research, and service organizations; (2) understand and deal with the stochastic nature of management systems and (3) integrate management systems into a series of different technological environments.

Faculty

The major professional competence of the faculty must be in engineering, and the faculty should be experienced in the management of engineering and/or technical activities.

PROGRAM CRITERIA FOR INDUSTRIAL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs using “industrial” or similar modifiers in their titles.

Curriculum
The curriculum must prepare graduates to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy.

The curriculum must include in-depth instruction to accomplish the integration of systems using appropriate analytical, computational, and experimental practices.

Faculty
Evidence must be provided that the program faculty understand professional practice and maintain currency in their respective professional areas.

Program faculty must have responsibility and sufficient authority to define, revise, implement, and achieve program objectives.

PROGRAM CRITERIA FOR MATERIALS, METALLURGICAL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs including "materials," "metallurgical," and similar modifiers in their titles. All programs in the materials related areas share these criteria, including programs with materials, materials processing, ceramics, glass, polymer, metallurgical, and similar modifiers in their titles.

Curriculum
The curriculum must prepare graduates to: (1) apply advanced science (such as chemistry and physics), computational techniques and engineering principles to materials systems implied by the program modifier, e.g., ceramics, metals, polymers, composite materials; (2) to integrate the understanding of the scientific and engineering principles underlying the four major elements of the field: structure, properties, processing, and performance related to material systems appropriate to the field and (3) to apply and integrate knowledge from each of the above four elements of the field to solve materials selection and design problems, and; to utilize experimental, statistical, and computational methods consistent with the program educational objectives.

Faculty
The faculty expertise for the professional area must encompass the four major elements of the field.

PROGRAM CRITERIA FOR MECHANICAL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria will apply to all engineering programs that include "mechanical" or similar modifiers in their titles.

Curriculum

The curriculum must require students to: (1) apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations); (2) to model, analyze, design, and realize physical systems, components or processes; and (3) prepare students to work professionally in either thermal or mechanical systems while requiring courses in each area.

Faculty

The program must demonstrate that faculty members responsible for the upper-level professional program are maintaining currency in their specialty area.

PROGRAM CRITERIA FOR MINING ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs including "mining" and similar modifiers in their titles.

Curriculum

The program must prepare graduates to: (1) apply mathematics through differential equations, calculus-based physics, general chemistry, and probability and statistics as applied to mining engineering problem applications; (2) to have fundamental knowledge in the geological sciences including characterization of mineral deposits, physical geology, structural or engineering geology, and mineral and rock identification and properties; (3) to be proficient in statics, dynamics, strength of materials, fluid mechanics, thermodynamics, and electrical circuits; (4) to be proficient in engineering topics related to both surface and underground mining, including: mining methods, planning and design, ground control and rock mechanics, health and safety, environmental issues, and ventilation; (5) to be proficient in additional engineering topics such as rock fragmentation, materials handling, mineral or coal processing, mine surveying, and valuation and resource/reserve estimation as appropriate to the program objectives.

The laboratory experience must prepare graduates to be proficient in geologic concepts, rock mechanics, mine ventilation, and other topics appropriate to the program objectives.

Faculty

Evidence must be provided that the program faculty understand professional engineering practice and maintain currency in their respective professional areas.

Program faculty must have responsibility and authority to define, revise, implement, and achieve program objectives.

PROGRAM CRITERIA FOR MARINE ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs that include “naval” or similar modifiers in their titles.

Curriculum

The program must prepare graduates to: (1) apply probability and statistical methods to naval architecture and marine engineering problems; (2) to have basic knowledge of fluid mechanics, dynamics, structural mechanics, materials properties, hydrostatics, and energy/propulsion systems in the context of marine vehicles and; (3) to have familiarity with instrumentation appropriate to naval architecture and/or marine engineering.

Faculty

Program faculty must have sufficient curricular and administrative control to accomplish the program objectives.

Program faculty must have responsibility and sufficient authority to define, revise, implement and achieve the program objectives.

PROGRAM CRITERIA FOR PETROLEUM ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs that include "petroleum," "natural gas," and similar modifiers in their titles.

Curriculum

The program must prepare graduates: to (1) be proficient in mathematics through differential equations, probability and statistics, fluid mechanics, strength of materials, and thermodynamics; (2) design and analysis of well systems and procedures for drilling and completing wells; (3) characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering methods; (4) design and analysis of systems for producing, injecting, and handling fluids; (5) application of reservoir engineering principles and practices for optimizing resource development and management and (6) the use of project economics and resource valuation methods for design and decision making under conditions of risk and uncertainty.

PROGRAM CRITERIA FOR CHEMICAL, BIOCHEMICAL, BIOMOLECULAR ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs that include "chemical," "biochemical", "biomolecular" and similar modifiers in their titles.

Curriculum

The curriculum must provide a thorough grounding in the basic sciences including chemistry, physics, and/or biology, with some content at an advanced level, as appropriate to the objectives of the program.

The curriculum must include the engineering application of these basic sciences to the design, analysis, and control of chemical, physical, and/or biological processes, including the hazards associated with these processes.

PROGRAM CRITERIA FOR SOFTWARE ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

These program criteria apply to engineering programs that include "software" or similar modifiers in their titles.

Curriculum

The curriculum must provide both breadth and depth across the range of engineering and computer science topics implied by the title and objectives of the program.

The curriculum must include: (1) fundamentals of computing, software design and construction, analysis requirements, security, verification and validation; (2) software engineering processes an tools appropriate for the development of complex software systems and (3) discrete mathematics, probability and statistics with appropriate applications for software engineering.

Faculty

Program faculty must demonstrate that the faculty members who impart the core topics of software engineering have an understanding of professional practice in software engineering and maintain currency in their respective specialized professional or academic areas.

- For Engineering Technology Programs:

PROGRAM CRITERIA FOR
AUTOMATIVE ENGINEERING TECHNOLOGY
AND SIMILAR NAMED PROGRAMS

These program criteria apply to engineering technology programs that include “automotive” or similar modifiers in their title.

Objective
An accreditable program will prepare graduates with technical and managerial skills necessary to enter careers in design, manufacturing, marketing, operation, and maintenance in the field of automotive engineering technology.
Graduates are expected to be prepared for design and management in the automotive field.

Student Outcomes
The nature and level of proficiency demonstrated by graduates in the outcomes prescribed below must be appropriate to the program objectives.

The field of automotive engineering technology is dependent on the application of computers inanalysis, design, manufacturing, and operation of facilities. The program must demonstrate that graduates are competent in the application of computer technologies commonly used in industry, governmental service, and private practice associated with land, sea, air, and space mobility.

Graduates must demonstrate proficiency in the application of probability and statistics to the solution of problems related to land, sea, air, and space mobility.

In the field of automotive engineering technology, management and technology are often inextricablyintertwined. The program must demonstrate that graduates have acquired the ability to applymodern and effective management skills in identification and investigation of problems, analysis odata, synthesis and implementation of solutions, and operations of facilities related to land, sea, air, and space mobility.

The program must demonstrate that graduates have a working knowledge of the design manufacture, and maintenance of major subsystems and technologies associated with land, sea, air, and space mobility.

PROGRAM CRITERIA FOR COMPUTER ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS.

These program criteria apply to engineering technology programs that include "computer" or similar modifiers in their titles.

Objective

An accreditable program in Computer Engineering Technology will prepare graduates with the skills necessary to enter careers in the design, application, installation, operation, and/or maintenance of computer systems.

Graduates are well prepared for development and implementation of computer systems.

Student Outcomes

Graduates must demonstrate knowledge and hands-on competence appropriate to the objectives of the program in:

a. the application of electric circuits, computer programming, associated software applications, analog and digital electronics, microcomputers, operating systems, and local area networks, and engineering standards to the building, testing, operation, and maintenance of computersystems and associated software systems.
b. the application of natural sciences and mathematics at or above the level of algebra and trigonometry to the building, testing, operation, and maintenance of computer systems and associated software systems.
c. the ability to analyze, design, and implement hardware and software computer systems.
d. the ability to apply project management techniques to computer systems
e. the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of computer systems and networks.

PROGRAM CRITERIA FOR INSTRUMENTAL AND CONTROL SYSTEMS ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include "instrumentation", "measurement", "metrology", "control", "robotics", "automation", or similar modifiers in their titles.

Objective

An accreditable program in instrumentation and control systems engineering technology will prepare graduates with the technical and managerial skills necessary to enter careers in design, manufacturing, marketing, operations, and maintenance in the fields of measurement, control, robotics, and automation engineering technology.

Graduates are qualified to undertake the design and specification of control systems and for the subsequent management of their installation and operation.

Student Outcomes

The field of instrumentation and control systems engineering technology is heavily dependent on the application of computers in the analysis, design, and operation of manufacturing and processing facilities. The program must demonstrate that graduates have the ability to:

a. apply concepts of automatic control, including measurement, feedback and feedforward regulation for the operation of continuous and discrete systems,
b. design and implement systems utilizing analog and/or digital control devices,
c. apply the concepts of chemistry, physics, and electricity/electronics to measurement and control systems,
d. apply the concepts of digital and microprocessor systems and functionality of system components/devices for the automation of processes,
e. apply the concepts of measurements and sensor selection, and
f. communicate the technical details of control systems using current techniques and graphical standards.
g. apply the concepts of mechanics, fluid mechanics, and heat transfer to the design of process control systems, and
h. understand and utilize programmable logic controllers (PLC), distributed control systems (DCS) and supervisory control systems for control of manufacturing and processing systems.

Mathematics forms the basis for design, synthesis and analysis in the field of instrumentation and control engineering technology.

Graduates must demonstrate proficiency in the utilization of differential and integral calculus and ordinary differential equations in the design, analysis, and performance assessment of control systems.

In the field of instrumentation and control engineering technology, management and technology are often inextricably intertwined. Therefore, graduates must demonstrate the ability to utilize modern and effective management skills for performing investigation, analysis, and synthesis in the implementation of automatic control systems.

PROGRAM CRITERIA FOR CONSTRUCTION ENGINEERING TECHNOLOGY AND SIMILARLY NAMED ENGINEERING PROGRAMS

These criteria apply to engineering technology programs that include "construction" or similar modifiers in their names.

Objective

An accreditable program will prepare your graduates with the skills necessary to perform in the construction, operation, and / or maintenance of the built environment and global infrastructure.
Graduates of engineering technologist training programs are prepared to specify project methods and materials, perform cost estimating and analysis, and manage construction activities.

Student Outcomes.

To the extent required by the Programs Educational Objectives, program graduates who train engineering technologists must:

a. Use techniques that are appropriate to manage and evaluate contracts, documents, and building codes.
b. Estimate costs, estimate quantities, and evaluate materials for construction projects.
c. Utilize measurement methods, hardware, and software that are appropriate for the field, laboratory, and construction-related administrative processes.
d. Apply fundamental computational methods and elementary analytical techniques in sub-disciplines related to construction engineering.
e. and. Produce and use design, construction and operations documents.
f. F. Perform economic analysis and cost estimates related to the design, construction and maintenance of systems associated with construction engineering.
g. Select appropriate construction materials and practices.
h. Apply appropriate construction management principles, laws, and ethics.
i. Perform standard design and analysis in at least one subdiscipline related to construction engineering.

PROGRAM CRITERIA FOR INFORMATION ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include "information" or similar modifiers in their titles.

Objective

An accreditable program in Information Engineering Technology will prepare graduates with thetechnical and project management skills necessary to enter careers in the design, application, installation, operation and/or maintenance of computer systems, networks, and telecommunications systems dedicated to the processing and transfer of information.

Graduates normally are well prepared for design, development, and management.

Student Outcomes

The field of Information Engineering Technology depends heavily on the application of computer and network components for use in the processing, analysis, and transfer of information.

Graduates must demonstrate knowledge and hands-on competence appropriate to the goals of the program in:

a. the application of computer and network hardware, operating systems, system and network administration, programming languages, applications software, and databases in the building, testing, operation, and maintenance of hardware and software systems.
b. the application of electrical, electronic, telecommunications, and digital signal propagationfundamentals in the building, testing, operation, and maintenance of hardware and softwaresystems.
c. the ability to design, implement, maintain and provide for the security of facilities involved withthe processing and transfer of information
d. the ability to apply project management techniques to facilities that process and transferinformation
e. the ability to apply discrete mathematics, and probability and statistics in the support offacilities that process and transfer information.

Given the breadth of technical expertise involved with information systems, and the unique objectives of individual programs, some programs may focus on preparing graduates with in-depth but narrow expertise, while other programs may choose to prepare graduates with expertise in broad spectrum of the field. Therefore, the depth and breadth of expertise demonstrated by graduates must be appropriate to support the goals of the program.

PROGRAM CRITERIA FOR TELECOMMUNICATIONS ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include "telecommunications" or similar modifiers in their titles.

Objective

An accreditable program in Telecommunications Engineering Technology will prepare graduates with the technical and managerial skills necessary to enter careers in the design, application, installation, management, operation, and/or maintenance of telecommunication systems.

Graduates are well prepared for development and implementation of telecommunications systems.

Student Outcomes

Graduates must demonstrate knowledge and hands-on competence appropriate to the goals of the program in:

a. the application of electric circuits, computer programming, associated software, analog and digital electronics, voice and data communications, engineering standards, and the principles of telecommunications systems in the solution of telecommunications problems.
b. the applications of physics to telecommunications systems in a rigorous mathematical environment at or above the level of algebra and trigonometry.
c. the ability to analyze, design, and implement telecommunications systems.
d. the ability to analyze and implement switching technologies, wide area networking technologies, and policy.
e. the ability to manage, design, and plan wide area networks.
f. the ability to utilize statistics/probability, transform methods, or applied differential equations in support of telecommunication systems and wide area networks.

PROGRAM CRITERIA FOR ELECTRICAL / ELECTRONIC ENGINEERING AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include “electrical” or “electronic(s)” or similar modifiers in their titles.

Objective

An accreditable program in Electrical/Electronic(s) Engineering Technology will prepare graduates with the technical and managerial skills necessary to enter careers in the design, application, installation, manufacturing, operation and/or maintenance of electrical/electronic(s) systems.

Graduates are well prepared for development and implementation of electrical/electronic(s) systems.

Student Outcomes

Graduates must demonstrate knowledge and hands-on competence appropriate to the goals of the program in:

a. the application of circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers, and engineering standards to the building, testing, operation, and maintenance of electrical/electronic(s) systems.
b. the applications of physics or chemistry to electrical/electronic(s) circuits in a rigorous mathematical environment at or above the level of algebra and trigonometry.
c. the ability to analyze, design, and implement control systems, instrumentation systems, communications systems, computer systems, or power systems.
d. the ability to apply project management techniques to electrical/electronic(s) systems.
e. the ability to utilize statistics/probability, transform methods, discrete mathematics, or applied differential equations in support of electrical/electronic(s) systems.

Given the breadth of technical expertise involved with electrical systems, and the unique objectives of individual programs, some programs may focus on preparing graduates with in-depth but narrow expertise, while other programs may choose to prepare graduates with expertise in a broad spectrum of the field. Therefore, the depth and breadth of expertise demonstrated by graduates must be appropriate to support the goals of the program.

PROGRAM CRITERIA FOR ELECTROMECHANICAL ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include "electromechanical" or similar modifiers in their title.

Objective
An accreditable program in electromechanical engineering technology will typically prepare graduates for applied design, development, and management of electromechanical systems.

Student Outcomes
The field of electromechanical engineering technology depends heavily on the integration of electrical, mechanical, computer, and network components to the design, application, operation, and maintenance of electromechanical systems.

Graduates must demonstrate knowledge and technical competency, appropriate to the objectives of the program, to:

a. Use computer-aided drafting or design tools to prepare graphical representations of electromechanical systems.
b. Use circuit analysis, analog and digital electronics, basic instrumentation, and computers to aid in the characterization, analysis, and troubleshooting of electromechanical systems.
c. Use statics, dynamics (or applied mechanics), strength of materials, engineering materials, engineering standards, and manufacturing processes to aid in the characterization, analysis, and troubleshooting of electromechanical systems.
d. Use appropriate computer programming languages for operating electromechanical systems.
e. Use electrical/electronic devices such as amplifiers, motors, relays, power systems, and computer and instrumentation systems for applied design, operation, or troubleshooting electromechanical systems.
f. Use advanced topics in engineering mechanics, engineering materials, and fluid mechanics for applied design, operation, or troubleshooting of electromechanical systems.
g. Use basic knowledge of control systems for the applied design, operation, or troubleshooting of electromechanical systems.
h. Use differential and integral calculus, as a minimum, to characterize the static and Dynamic performance of electromechanical systems.
i. Use appropriate management techniques in the investigation, analysis, and design of electromechanical systems.

The program must demonstrate that its graduates can apply the specific principles of the program in the analysis, design, development, implementation, operation, maintenance, or supervision of more advanced electromechanical systems or processes based on the orientation of the program and the needs of its constituencies.

PROGRAM CRITERIA FOR INDUSTRIAL ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include “industrial” or similar modifiers in their titles.

Objective

An accreditable program in Industrial Engineering Technology will prepare graduates with the technical and managerial skills necessary to develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy. Graduates will be prepared for careers in higher levels of system design, integration, and management.

Student Outcomes

Graduates must demonstrate:

a. the ability to accomplish the integration of systems using appropriate analytical, computational, and application practices and procedures.
b. ability to apply knowledge of probability, statistics, engineering economic analysis and cost control, and other technical sciences and specialties necessary in the field of industrial engineering technology.
c. The ability to analyze and implement projects related to their field of action.

PROGRAM CRITERIA FOR MECHANICAL ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include "mechanical" or similar modifiers in their titles.

Objective

An accreditable program in Mechanical Engineering Technology will prepare graduates with knowledge, problem solving ability, and hands-on skills to enter careers in the design, installation, manufacturing, testing, evaluation, technical sales, or maintenance of mechanical systems. Level and scope of career preparation will depend on the degree level and specific program orientation. Graduates typically have strengths in the analysis, applied design, development, implementation, or oversight of more advanced mechanical systems and processes.

Students Outcomes

The mechanical engineering technology discipline encompasses the areas (and principles) of materials, applied mechanics, computer-aided drafting/design, manufacturing, experimental techniques/procedure, analysis of engineering data, machine/mechanical design/analysis, conventional or alternative energy system design/analysis, power generation, fluid power, thermal/fluid system design/analysis, plant operation, maintenance, technical sales, instrumentation/control systems, and heating, ventilation, and air conditioning (HVAC), among others.

As such, student outcomes, based on specific program objectives, may have a narrower focus with greater depth, selecting fewer areas, or a broader spectrum approach with less depth, drawing from multiple areas. However, all programs must demonstrate an applied basis in engineering mechanics/sciences.

The program must demonstrate that graduates can apply specific program principles to the analysis, design, development, implementation, or oversight of more advanced mechanical systems or processes depending on program orientation and the needs of their constituencies.

PROGRAM CRITERIA FOR MARINE ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include “marine” or similar modifiers in their titles.

Objective
An accreditable program will prepare graduates with the technical and managerial skills necessary to enter a variety of different careers in the field of marine engineering technology.

Graduates must have strengths in their knowledge of operations, maintenance, and manufacturing and be well prepared for design and management in marine engineering technology.

Student Outcomes
The field of marine engineering technology is dependent on the application of the technical sciences to marine equipment, systems, and vehicles.

The program must demonstrate that the graduates are proficient in:

a. applying the principles of college-level physics and chemistry to problems associated with marine equipment, systems and vehicles.
b. applying the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, dynamics, and energy systems to marine equipment, systems and vehicles.

Knowledge of modern instrumentation and proper laboratory practices is important in the field of marine engineering technology. The program must demonstrate that graduates are proficient in:

c. the use and application of instrumentation for measuring physical phenomena related to naval architecture and/or marine engineering technology, and
d. the design of experiments, data collection, analysis, and formal report writing.

The program must demonstrate that graduates are proficient in:

e. the operation, maintenance, analysis, and management of modern marine power plants and associated marine auxiliary equipment and systems.
f. the use of design manuals, material/equipment specifications, and industry regulations applicable to marine engineering technology.

PROGRAM CRITERIA FOR CHEMICAL, PROCESS, PLANT ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include “chemical”, “process”, “plant”, or similar modifiers in their titles.

Objective

An accreditable program will prepare graduates with the technical and managerial skills necessary to enter careers in design, manufacturing, marketing, operation, and maintenance in the field of chemical engineering technology.

Graduates typically have strengths in their knowledge of laboratory applications, design, technical service and supervision.

Student Outcomes

The field of chemical engineering technology is dependent upon the application of chemistry in an industrial setting. The program must demonstrate that graduates have a working knowledge and ability to solve technical problems by the industrial application of inorganic chemistry, organic chemistry, analytical chemistry; physics, and process stoichiometry.

The program must also demonstrate that graduates possess a deeper and broader knowledge which enables them to solve technical and managerial problems.

In the field of chemical engineering technology, the operation of chemical processes is extremely important. The program must demonstrate that graduates have the ability to apply:

a. The concepts of chemical engineering unit operations such as mass transfer, heat transfer, distillation, and evaporation to the design, operation, and maintenance of chemical processes,
b. The principles of thermodynamics; process control and instrumentation, computer applications, and materials science to the design, operation, and maintenance of chemical processes.

The nature and level of proficiency must be appropriate to the program objectives.

In the field of chemical engineering technology, the various fields of the chemical sciences and the operation of industrial chemical process equipment are often inextricably intertwined. The program must demonstrate that graduates have the ability to operate, test, and check out chemical process equipment in accordance with appropriate safety, health and environmental considerations and regulations.

PROGRAM CRITERIA FOR SURVEYING / GEOMATICS ENGINEERING TECHNOLOGY AND SIMILARLY NAMED PROGRAMS

These program criteria apply to engineering technology programs that include “surveying”, “geomatics”, or similar modifiers in their title.

Objective

An accreditable program in Surveying/Geomatics Engineering Technology will prepare graduates with the technical skills necessary to enter careers in boundary and/or land surveying, geographic and/or land information systems, engineering project surveying, photogrammetry, mapping and geodesy, remote sensing, or other related areas. The level and scope of career preparation will depend on the degree level and specific program orientation.

Graduates raduates possess a stronger background in geodetic science, photogrammetry and remote sensing, and data analysis, and are prepared to design and select appropriate measurement systems, analyze positional accuracy in conformance with appropriate standards, prepare land records and plats to meet legal requirements, and manage surveying/geomatics activities.

Student Outcomes

Programs must demonstrate that graduates are capable of:

a. Utilizing modern measurement technologies to acquire spatial data;
b. Employing industry-standard software to solve technical problems;
c. Applying technical concepts to the design of measurement systems to meet project requirements;
d. Analyzing data for conformance with precision and accuracy requirements;
e. Performing standard analysis and design in at least one of the recognized technical specialties within surveying/geomatics technology that are appropriate to the goals of the program. The specialties include boundary and/or land surveying geographic and/or land information systems, engineering project surveying, photogrammetry, mapping and geodesy, and other related areas.

COMPLEMENTARY CRITERIA

Each program must satisfy the complementary criteria selected in its respective Evaluation Request, considering that:

1. **Criterion 10 - Research and Social Responsibility** is applicable in evaluations for initial accreditation and reaccreditation purposes.
2. **Criterion 11 - International Context** is only applicable in evaluations for reaccreditation purposes.

The selection of a complementary criterion in the Evaluation Request implies that it will be considered in determining the final accreditation action of the program.

Criterion 10. Research and Social Responsability.

- For Architecture, Science, Computing and Egineering Programs:

  The program must articulate the teaching-learning process with R+D+i+e and social responsibility activities, consistent with the objectives of the program, in which students and teachers participate.
  The program must manage, regulate and ensure the quality of the R+D+i+e carried out by the teachers, related to the disciplinary area to which they belong, in coherence with the R+D+i+e policy of the institution.
  The program must ensure the rigor, relevance and quality of the R+D+i+e work of the students to obtain the degree and professional title.
  The program must promote that the results of the R+D+i+e work carried out by the professors are published, incorporated into the teaching and knowledge of the academic community and students.

- For Engineering Technology Programs:

  The program must develop an annual work plan in a participatory manner, in coordination with the institutional educational project.
  The program must monitor the time between entry, exit and graduation of students.
  The program must collect information on trends in science, technology and innovation to help you make decisions and anticipate changes in your specialty.
  The program must enable the student to participate in the development of applied research projects, promoting their rigor, relevance and quality.
  The program should establish binding procedures that encourage the application of technical knowledge that responds to specific local, regional and national needs.
  The program should promote the introduction or improvement of a good or service, process or method that combines new knowledge and / or technologies, as well as combinations of existing ones.
  The program must establish mechanisms for monitoring and evaluating projects, innovation work and applied research, incorporating their results into the teaching-learning processes.

The program must identify, define and develop social responsibility actions articulated with the comprehensive training of students.

The program must implement environmental policies and monitor compliance with prevention measures in this area.

Criterion 11. International Context

The program curriculum must include a minimum of:

- For Engineering Programs: 240 ECTS credits.
- For Engineering Technology Programs: 180 ECTS credits

1 ECTS credit is equal to 25 - 30 hours per semester, of student workload.

The program must ensure that graduating students achieve student outcomes:

- For Engineering Programs: From [RE-I01] to [RE-I12].
- For Engineering Technology Programs: From [RE-T01] to [RE-T12].

The program must demonstrate that the curriculum is consistent with the achievement of student outcomes. The results of the admission, transfer, performance monitoring and evaluation, counseling, and program graduation processes should be monitored.

GLOSSARY OF TERMS

1. **ICACIT Accreditation:** ICACIT Accreditation is a voluntary process by which a program is evaluated to determine if it meets ICACIT quality criteria. Accredited status is not permanent and must be renewed periodically. The ICACIT Accreditation is an audit of compliance with international standards of the *Washington Accord* and the *Sydney Accord* of the *International Engineering Alliance*, *the Seoul Accord*, *the Canberra Accord* and the *European Network for Accreditation of Engineering Education*, adopted by ICACIT.
2. **Service Activities of the Educational Institution**: Consist of participation in internal committees and other activities of representation.
3. **Self-study:** It is the internal review process of a program in which its strengths and limitations are expected to be analyzed quantitatively and qualitatively.
4. **Quality Assurance:** Term that refers to a permanent and continuous evaluation process (assessment, follow-up, guarantee, maintenance, and improvement) of the quality of a higher education system, institution, or program. As a regulatory mechanism, quality assurance focuses on both accountability and improvement, providing feedback and judgment through a consistent process and well-established criteria. Quality assurance activities depend on the existence of the necessary institutional mechanisms preferably supported by a solid quality culture. Quality management, quality improvement, quality control and quality evaluation are means by which quality assurance is ensured. (Taken from "Quality assurance and accreditation: a glossary of basic terms and definitions", UNESCO-CEPES 2007)
5. **Academic quality:** It is defined as the level of achievement of the objectives of the program in accordance with the institutional mission and the needs of the constituencies; that enables graduates to achieve learning outcomes and enter professional practice.
6. **Evaluation cycle:** Series of activities that must be completed in an evaluation process for program accreditation purposes. The ICACIT evaluation cycle regularly lasts 12 months.
7. **Basic Sciences University Level:** Are disciplines focused on knowledge or understanding of the fundamental aspects of natural phenomena. They are an indispensable part of an engineering program and consist of chemistry, physics, biology and other natural sciences including life, earth, and space sciences.
8. **Engineering Sciences**: Have their roots in mathematics and basic sciences but carry knowledge further toward the creative application necessary to resolve engineering problems and represente the basis of the specialized discipline knowledge. These may include topics such as solid mechanics, fluid mechanics, thermodynamics, electrical and electronic circuits, computer science (except programming topics), materials science, soil mechanics, aerodynamics, control systems, among others, depending on the discipline.
9. **Advisory Committee:** It is made up of representatives of professional organizations, companies and others, with extensive experience, who contribute to the periodic review of the curriculum and advise the program in the establishment and review of its educational objectives.
10. **Counseling:** It is an educational service that has a formal planning of activities and qualified managers.
11. **Constituencies:** Faculty, students, graduates, employees, advisory committee and others consider the program.
12. **Student performance**: It is the student's development in the cognitive, affective and psychomotor fields.

13. **Engineering design:** It is a creative, iterative and decision-making process, in which the basic sciences, mathematics, and the engineering sciences are applied to seek for viable solutions to problems that does not necessarily have a single answer. This process includes conceptualizing ideas; identify and formulate problems; exhaustively apply various disciplines and technologies; create ideas; identify restrictions and find solutions to the problem under these restrictions; verify the results; demonstrate ideas with plans, arguments, equations or programs; communicate with others; collaborate with others (teamwork); and continually plan and implement as planned. It is expected that all these tasks will be carried out in a holistic manner. The restrictions cover issues of public health and safety, cultural, social, economic and environmental.
14. **General Education**: they are studies that provide an appreciation of those broader issues that allow engineers to practice professionally in society. These studies may include management, economics, law, history, finance or a foreign language.
15. **Application environment:** It is a real professional application environment (Business, medicine, education, agribusiness, etc.)
16. **Environment of information systems:** The courses must have contents linked to their application in information systems.
17. **Alumni:** Is that student who has met all the requirements to complete a program.
18. **Diverse Team**: Team whose members have different characteristics such as gender, age, nationality, ethnic group, culture, etc., and a different formation or experiences that can bring different perspectives.
19. **Evaluation**: evaluantion consits in 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.
20. **Graduate:** It is the person who has completed a program, meeting the established requirements, and has obtained the academic degree of bachelor's degree in the case of universities or technical bachelor's degree in the case of institutes.
21. **Graduating student:** It is that person who is about to complete a program and obtain the respective academic degree.
22. **Appropriate tools for measuring student outcomes**: Those tools relevant to the nature, characteristics, and aspects of the student outcome being measured.
23. **R+D+i+e:** Research, development and innovation and entrepreneurship.
24. **Self-Study Report:** This is the primary document each program uses to explain how it meets all applicable ICACIT accreditation criteria, policies, and procedures. The self-study report forms the initial basis for determining whether the program meets ICACIT requirements.
25. **University Level Mathematics**: consists of mathematics above the algebra and trigonometry level. These represent a solid foundation for engineering topics and should emphasize concepts and mathematical principles, as well as numerical analysis.
26. **Assessment:** assessment consists in one or more processes that identify, collect, and prepare data to evaluate the attainment of student outcomes and program educational objectives. 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.
27. **Monitor:** Verify that a given process is carried out according to schedule, without implying a response or action.

28. **Program Educational Objectives**: program educational objectives are broad statements that describe what graduates are expected to attain in the first years after graduation. Program educational objectives are based on the needs of the program's constituencies.
29. **Postgraduate:** Master's degree as a minimum requirement.
30. **Complex Computing Problems:** are those that require coherent and detailed computer knowledge, with an emphasis on the discipline of the program; and have one or more of the following characteristics:
    - Are high level problems including components, processes or sub-problems;
    - they are rare problems and have no obvious solution;
    - require abstract thinking to formulate appropriate models;
    - are outside the scope of standards or standard practices of the discipline;
    - Involve diverse groups of stakeholders with widely varying needs;
    - involve a variety of powerful or conflicting factors.
    - identifies a requirement or the cause of a problem that is ill defined or unknown.
    - has significant consequences in a range of contexts.
31. **Complex Engineering Problems:** are those that requires in-depth engineering fundamentals and specialized engineering knowledge, including research literature of the discipline and one or more of the following characteristics:
    - Are high level problems including components or sub-problems;
    - Involve infrequently encountered issues;
      and its solution has one or more of the following characteristics:
      - Having no obvious solution and require abstract thinking, originality in analysis to formulate suitable models;
      - Adressing problems not encompassed by current standards and codes of practice for professional engineering;
      - Involving diverse groups of stakeholders with widely varying needs;
      - Involving wide-ranging or conflicting technical, engineering and other issues.
32. **Broadly-defined Engineering Problems:** are those that require coherent and detailed engineering knowledge with emphasis on the applicable technological area; and have one or more of the following characteristics:
    - address parts or systems within complex engineering systems;
    - they are problems that are solved in well accepted, but innovative and sustainable ways;
    - can be solved by structured analysis techniques;
    - may be partially outside the scope of norms, standards and codes;
    - involve various stakeholder groups with different and sometimes conflicting needs;
    - involve a variety of factors that can impose conflicting restrictions.
33. **Documented and effective process:** One that has a written and/or graphic description of how it is executed and is effective in a sustained manner over time.
34. **Program:** It is an organized and integrated educational experience that culminates in obtaining an academic degree. The program will have educational objectives, student outcomes, a curriculum, faculty, and facilities.
35. **Different Programs:** Those programs that are possible to differentiate by means of the academic degree obtained by the graduates upon completing it and that specifies the location, branch, campus or location where it is offered, in addition to the modality in which it is offered.

36. **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.
37. **Wellness services:** Programs that manage health care services, medical insurance, social assistance, scholarships, sports, arts, among others.
38. **Systematically:** Carried out continuously and periodically, based on a set of principles, rules, methods or procedures.

PROPOSED CHANGES TO ACCREDITATION CRITERIA

Changes in the accreditation criteria can be proposed by the accreditation committees and must be approved by the ICACIT Board of Directors. Typically, changes to the accreditation criteria take effect in the evaluation cycle immediately upon approval. However, this period may be extended, when deemed appropriate, and suggested changes may require a period for public review and comment before approval.

The following section presents the proposed changes to the accreditation criteria as approved by the ICACIT Board of Directors in its session in December 2021, for a review and comment period that expires on June 30, 2022. The Board of Directors of ICACIT will determine, based on the comments received and the proposals of the accreditation committees, the content of the accreditation criteria that are adopted.

Comments related to the proposed changes should be sent in writing to Av. Del Pinar 152. Office 707. Santiago de Surco. Lima 033. Peru, or by email to acreditacion@icacit.org.pe.

Proposed Changes

No proposed changes to the accreditation criteria have been determined.