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(CASEE)

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CRITERIA FOR THE ACCREDITATION OF ENGINEERING PROGRAMS IN THE PHILIPPINES

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Introduction

The Philippine Technological Council (PTC) is the sole organization recognized by the Commission on Higher Education to accredit engineering programs in the Philippines, in accordance with international standards adopted by and adhered to by signatories to accords, arrangements and agreements such as, among others, the Washington Accord to which PTC, in behalf of the Philippine jurisdiction, is currently maintaining or still seeking membership. For this purpose, PTC created the PTC Accreditation and Certification Board for Engineering and Technology (PTC-ACBET) which is charged with the mandate to implement the PTC policies, procedures and process for the certification and accreditation of engineering programs. Furthermore, PTC created the Engineering Accreditation Commission (EAC) under the P-ACBET whose main function is to undertake the assessment and evaluation of engineering program and recommends certification and accreditation of the said program to the PTC-ACBET and to PTC. PTC, consistent with its policy accreditation, provides its criteria for accreditation to the public. These criteria are the basis for decisions on accreditation of engineering programs submitted by higher educational institutions (HEIs). It is the responsibility of HEIs seeking accreditation of an engineering program to clearly demonstrate that the program fulfils or exceeds the criteria stated herein.

The PTC-ACBET-EAC criteria are intended to promote the continuous quality improvement of an engineering program and provide thresholds of quality assurance for accreditation. In keeping with the principles of continuous quality improvement, these criteria are subject to change from time to time.

This document contains three sections. The first section defines important terms appearing in the criteria. The second section provides general criteria applicable to all baccalaureate engineering degrees. The third section specifies additional criteria, if any, pertaining to various specializations in engineering.

Definitions

1. **Institutional Mission and Vision**

   Institutional Mission and Vision are statements on the long-term view of the educational institution of itself and of the world within which it operates including the fundamental purpose of its existence, its long-term role and stature, and, what it does to achieve this purpose and how it would like to play its role.

2. **Program Educational Objectives**

   Program educational objectives are broad statements that describe what graduates are expected to achieve in their professional and career practice three to five years after graduation. Program educational objectives are based on the needs of the program's constituencies.

3. **Student Outcomes**

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

4. **Duration of a Semester (quarter) and Number of Semesters (quarters) in a Baccalaureate Engineering Program**

   An engineering baccalaureate degree program usually consists of a curriculum of 10 semesters. Each semester typically consists of several courses conducted over 15 weeks. The total credits for a semester is typically 16 credit hours. One credit hour of a lecture course consists of one hour per week for 15 weeks. One credit hour of laboratory course consists of three hours of laboratory work per week for 15 weeks.

5. **Assessment**

   Assessment is 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 objective or outcome being measured. Appropriate sampling methods may be used as part of an assessment process.

6. **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 and program educational objectives are being attained. Evaluation results in decisions and actions regarding program continuous quality improvement.

7. **Continuous Quality Improvement**

   Continuous Quality Improvement is a periodic feedback process for changing any aspect of a program whereby formal results from assessment and evaluation and other informal observations are utilized in the formulation of the changes, with expected higher degrees of attainment of program educational objectives and higher degrees of attainment of student outcomes.

8. **Accreditation (Program Accreditation)**

   Recognition or acknowledgement that a program meets applicable criteria as a result of an assessment and evaluation process.

9. **Certification**

   Recognition or acknowledgement given to the implementation of an assessment and evaluation process for a program as having substantially met the requirements of PTC policies, guidelines, criteria and procedures.

10. **Complex Engineering Problems**

    A class of problem with characteristics further defined in Section 4.1 of the IEA Graduate Attributes and Professional Competence Version 3: 21 June 2013. These are problems that cannot be resolved without in-depth engineering knowledge and have some or all of the following characteristics:

    a) Involve the use of research-based knowledge much of which is at the forefront of the professional discipline and which allows a fundamental-based, first principles analytical approach
    b) Involve wide-ranging or conflicting technical, engineering and other issues
    c) Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
    d) Involve infrequently encountered issues
    e) Are outside problems encompassed by standards and codes of practice for professional engineering
    f) Involve diverse groups of stakeholders with widely varying needs
    g) Have significant consequences in a range of contexts
    h) Are high level problems including many component parts and sub-problems

Acknowledgements

The Philippine Technological Council (PTC) acknowledges with gratitude the many individuals who contributed to the crafting and continuous development of the Certification and Accreditation System for Engineering Education (CASEE) of the Council. The recognition of the expert contributions from the Philippine Accrediting Association of Schools, Colleges and Universities (PAASCU), the Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA), and the Accreditation Association of Chartered Colleges and Universities in the Philippines (AACCUP) cannot be overemphasized. The long years of experience of the experts from these bodies and those of PTC's own expert consultants from the various sectors of engineering practice, and, engineering education delivery and accreditation have been carefully built into this current version of CASEE.

The PTC also recognizes the significant influences of the American educational system in the jurisdiction's own education system. The fact that majority of the jurisdiction's own engineering graduates, who are now leaders of the various educational institutions of higher learning, pursued advanced studies in American higher educational institutions attests to this leaning. It is in this vein, that PTC has patterned its CASEE significantly to the ABET Accreditation system for which recognition and citation is due and proper. The advises and influences from our mentors from Engineers Australia and the Institute of Engineering Education of Taiwan (IEET) cannot be overemphasized.

The 2018-2019 accreditation cycle represents the first period for the implementation of this updated version of CASEE by the PTC-Accreditation and Certification Board for Engineering and Technology (ACBET), the body created by the PTC to implement its policies, procedures, criteria and guidelines for the accreditation of engineering education in the jurisdiction. It is intended to be applied to the remaining 5-year engineering programs being implemented by education providers starting August 2018. The version already incorporates many features that hopefully will close the gaps between CASEE and those of the Washington Accord requirements.

PTC, through this accreditation process and the continued collaboration among its stakeholders, hopes to nurture its contribution to the continuous improvement of the country's engineering educational system and the country's ability to prepare the next generations of engineers for national and global challenges.

I. GENERAL CRITERIA FOR BACCALAUREATE LEVEL PROGRAMS

1. Program Educational Objectives

There must be documented and published program educational objectives that are consistent with the mission and vision of the institution. The program educational objectives shall reflect the particular field(s) of engineering practice and the associated area(s) of specialization, the desired characteristics and/or capabilities of the graduates after a few years of their career following graduation, the anticipated career destinations of graduates and the needs of the appropriate external constituencies.

A formal and documented process to develop and review the program educational objectives is in place. The review process shall be periodic and shall ensure and demonstrate that the objectives are based on the needs of the program's various stakeholders. External stakeholders' inputs are critical to the development, review and monitoring process of the objectives.

2. Student Outcomes

The program must have established and documented student outcomes that foster the attainment of the program educational objectives by the graduates. The program must demonstrate that graduates of the program possess the attributes of the student outcomes by the time of graduation. PTC adopts the set of Graduate Attributes published by the Washington Accord of the International Engineering Alliance as the bases for the alignment of its Student Outcomes.

Graduates are expected to build on this foundation as they progress with their practice of engineering.

Student outcomes are outcomes enumerated as (a) through (l). There may be other student outcomes specified under Section *II* on Specific Program Criteria.

a) ability to apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems

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

c) ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability, in accordance with standards

d) ability to function on multidisciplinary teams

e) ability to identify, formulate, and solve complex engineering problems

f) understanding of professional and ethical responsibility

g) ability to communicate effectively

h) broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) recognition of the need for, and an ability to engage in life-long learning

j) knowledge of contemporary issues

k) ability to create, select and apply appropriate techniques, resources, skills, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitation.

l) knowledge and understanding of engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments

3. Students

Students admitted to the program must have the educational background needed to undertake the tertiary-level treatment of the engineering degree courses and have a reasonable prospect of achieving the student outcomes. Appropriate policies and processes must be in place and enforced for admissions, transfers, progression, retention, student progress monitoring and performance evaluation, student advising on curricular and career matters, guidance and support, academic exchange, promotion and graduation, and ensure that the students continually achieve desired learning outcomes.

The program must ensure and document that all students who are promoted or graduated meet all the requirements for promotion or graduation.

4. Faculty and Support Staff

There must be a sufficient number of competent faculty to cover all of the curricular areas of the program and to assure adequate levels of student-faculty interaction and student advising. The faculty must have the appropriate academic qualifications and professional competencies needed to assure the continuity and stability of the program.

The program must not be critically dependent on a single individual; the faculty must be involved in implementation and decisions of the program. The program must have professional development opportunities for the faculty to participate in research, scholarly work, professional development activities and industrial interaction. The program must establish an evaluation method to determine the educational contributions of each faculty member and provide it to the faculty members involved in the program. The evaluation of educational contributions must be implemented in accordance with the method.

There must be a sufficient number of technical, laboratory and support staffs to ensure that there is a satisfactory level of technical support in shops, maintenance of equipment, management of laboratories and general support. The technical, laboratory and support staffs must have adequate qualifications and experience to assure the quality of the program. There must be a development program for the support staff.

5. Curriculum

There is no minimum specification of credit hours in any of the following areas, but less than one year of mathematics and basic science, and less than one and a half years of engineering science including design, research and practical training need to be justified carefully and in sufficient details in terms of meeting student outcomes and program educational objectives. There must be sufficient coverage to ensure achievement of the student outcomes. The curriculum must cover the following 6 areas:

a) Mathematics and basic sciences: The study of mathematics and basic sciences is fundamental in understanding the physical world in relation to engineering. It will serve as a foundation to the engineering theories and principles

b) Engineering Sciences: have roots in the mathematical and physical sciences, and where applicable, in other basic sciences but extend knowledge and develop models and methods in order to lead to engineering applications and solve engineering problems

c) Engineering Design and Synthesis: is the creative, iterative and often open-ended process of conceiving and developing components, systems and processes. Design requires the

integration of engineering, basic and mathematical sciences, working under constraints, taking into account economic, health and safety, social and environmental factors, codes of practice and applicable laws, and standards in the field. 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.

d) Complementary Studies: Disciplines outside engineering which are essential for professionalism and ethics. Studies are selected from political science, economics, effective communication, literature, history, art, philosophy, psychology, ethics, etc

e) Laboratory and Field Work - Courses should be supported by meaningful laboratory work, well coordinated with the lecture material and supported with relevant up-to-date equipment.

f) Practical training: Exposure of the students to industry, which enriches the total engineering educational program.

6. Facilities and Learning Environment

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.

7. Leadership and 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.

8. Extension Service, Community -Oriented Programs and Industry-Academe Linkage

a) Extension Service

The program shall provide non-degree educational service such as short courses on new technologies and new professional topics, to assist engineers from industry in keeping abreast of new developments in the field. Some short courses may provide summaries of findings from the research of faculty. New courses may be developed with collaboration from industry and engineering societies.

b) Community-Oriented Programs

There shall be evidence that students and student organizations have programs to assist communities not only as an avenue for societal service but also to gain understanding of the impact of engineering solutions to the local context. Possible projects may involve assistance to high school students on potential science/engineering fairs. Community assistance may involve projects such as helping design low-cost computing, low-cost access to the internet, and such other activities that involve the general and affordable utilization of their technological expertise. Dialogues with the communities to determine their needs should be explored first.

c) Industry-Academe Linkage

i) There must be regular active participation from industry in planning and defining program educational objectives, student outcomes and curricula to ensure that these are relevant and up-to date with societal and professional requirements.

ii) There should be faculty/student industry exposure through internships, industry-visits, collaborative projects under professionals in industry and industry-based final year projects.

9. Continuous Quality Improvement (CQI)

- There must be a recorded process for assessment and evaluation of the student outcomes.
- There must be a recorded process for assessment and evaluation of the program educational objectives.
- There must be evidence that results of the evaluation of student outcomes and results of the evaluation of program educational objectives are utilized to make changes in the program processes such as course syllabi, curriculum, and any other aspect of the program to improve the degrees to which the student outcomes and program educational objectives are achieved.
- There shall be feedback to and from all concerned stakeholders on the achievement of undergraduate students for the student outcomes and graduates for the achievement of the program educational objectives.
- There shall be a Continuous Quality Improvement program with adequate supporting resources.

2. SPECIFIC PROGRAM CRITERIA

- **Aeronautical and Aerospace Engineering**
- **Agricultural Engineering**
- **Chemical Engineering**
- **Civil Engineering**
- **Computer Engineering**
- **Electrical Engineering**
- **Electronics Engineering**
- **Geodetic Engineering**
- **Industrial Engineering**
- **Marine Engineering**
- **Mechanical Engineering**
- **Metallurgical Engineering**
- **Mining Engineering**
- **Naval Architecture and Marine Engineering**
- **Sanitary Engineering**

PROGRAM CRITERIA FOR
AERONAUTICAL ENGINEERINGAND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Society of Aerospace Engineers of the Philippines

These program criteria apply to engineering programs with “aeronautical” and/or “aerospace” engineering in their titles.

1. Curriculum

Aeronautical engineering programs must demonstrate that graduate knowledge of aerodynamics, aerospace materials, structures, propulsion, flight mechanics, and stability and control.

Astronautical engineering programs must demonstrate that graduates have a knowledge of orbital mechanics, space environment, altitude determination and control, telecommunications, space structures, and rocket propulsion.

Aerospace engineering programs or other engineering programs must demonstrate that graduates have knowledge covering one of the areas – aeronautical engineering or astronautical engineering as described above- and, in addition, knowledge of some topics from the area not emphasized.

Programs must also demonstrate that graduates have design competence that includes integration of aeronautical or astronautical topics.

2. Faculty

Program faculty must have responsibility and sufficient authority to define, revise, implement, and achieve program objectives. The program must demonstrate that faculty teaching upper-division courses have an understanding of current professional practice in the aerospace industry.

PROGRAM CRITERIA FOR AGRICULTURAL AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Philippine Society of Agricultural Engineers

These program criteria apply to engineering programs with “agricultural engineering” in their titles.

1. Curriculum

   Programs must demonstrate that graduates have proficiency in mathematics through differential equations and in biological and engineering sciences consistent with the program educational objectives. Competence must be demonstrated in the application of engineering to agriculture, aquaculture, forestry, human, or natural resources.

2. Faculty

   The program shall 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 CHEMICAL AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Philippine Institute of Chemical Engineers

These program criteria apply to engineering programs with “chemical engineering” in their titles.

1. Curriculum

   The program must be consistent with the CHED – CMO and should demonstrate that graduates have: the competence to apply (grounding in the) mathematics and basic sciences including chemistry, physics, and biology appropriate to the objectives of the program; and sufficient knowledge in the application of these basic sciences to enable graduates to plan and undertake research and development, design, apply value engineering, analyze, and control physical, chemical and biological processes, consistent with the program educational objectives. This also includes the preparation of feasibility studies and materials specification and supervision of the installation of industrial plant, the operations of the plant and the related pollution control abatement processes or operations taking cognizance of quality, environmental and health and safety management systems in pursuit of these.

2. 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, and/or by education and design experience. The program must demonstrate that it is not critically dependent on one individual.

The program must demonstrate that faculty members responsible for the upper-level professional programs are maintaining currency in their specialty area. Evidence must be provided that the program faculty understand professional practice and maintain currency in their respective professional areas.

PROGRAM CRITERIA FOR CIVIL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Philippine Institute of Civil Engineers

These program criteria apply to engineering programs with “civil engineering” in their titles.

1. Curriculum

The program must demonstrate that graduates can: apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives; apply knowledge of four technical areas appropriate to civil engineering; conduct civil engineering experiments and analyze and interpret the resulting data; design a system, component, or process in more than one civil engineering context; explain basic concepts in management, business, public policy, and leadership; and explain the importance of professional licensure.

2. 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
COMPUTER ENGINEERING
AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Institute of Electronics Engineers of the Philippines (IECEP)
(Computer Engineering Division)

These program criteria apply to engineering programs with “computer engineering” in their titles.

1. Curriculum

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

The program must demonstrate that graduate have: knowledge of probability and statistics, including applications appropriate to the program name and objectives; and knowledge of mathematics through differential equations, basic sciences, computer science, and engineering sciences necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to program objectives.

Programs containing the modifier “computer” in the title must also demonstrate that graduates have a knowledge of discrete mathematics.

2. 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 and/or by education and design experience. The program must demonstrate that it is not critically dependent on one individual.

PROGRAM CRITERIA FOR
ELECTRICAL ENGINEERING
AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Institute of Integrated Electrical Engineers

These program criteria apply to engineering programs with “electrical engineering” in their titles.

1. Curriculum

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

The program must demonstrate that graduate have: knowledge of probability and statistics, including applications appropriate to the program name and objectives; and knowledge of mathematics through differential equations, basic sciences, computer science, and engineering sciences necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to program objectives.

Programs containing the modifier “electrical” in the title must also demonstrate that graduates have a knowledge of advanced mathematics, typically including, linear algebra, complex variables, and discrete mathematics.

2. 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, and/or by education and design experience. The program must demonstrate that it is not critically dependent on one individual.

PROGRAM CRITERIA FOR
ELECTRONIC ENGINEERING
AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Institute of Electronics Engineers of the Philippines (IECEP)

These program criteria apply to engineering programs with “electronic engineering” in their titles.

1. Curriculum

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

The program must demonstrate that graduate have: knowledge of probability and statistics, including applications appropriate to the program name and objectives; and knowledge of mathematics through differential equations, basic sciences, computer science, and engineering sciences necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components, as appropriate to program objectives.

Programs containing the modifier “electronics” in the title must also demonstrate that graduates have a knowledge of advanced mathematics, typically including, linear algebra, complex variables, and discrete mathematics.

2. 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 and/or by education and design experience. The program must demonstrate that it is not critically dependent on one individual.

PROGRAM CRITERIA FOR GEODETIC ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Geodetic Engineers of the Philippines

These program criteria apply to engineering programs with “geodetic engineering” in their titles.

1. Curriculum

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

2. Faculty

   Programs must demonstrate that faculty members teaching courses that are primarily design in content are qualified to teach the subject matter by virtue of professional licensure or by educational and design experience.

PROGRAM CRITERIA FOR INDUSTRIAL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Philippine Institute of Industrial Engineers

These program criteria apply to engineering programs with “industrial engineering” in their titles.

1. Curriculum

   The program must demonstrate that graduates have the ability to design, develop, implement, and improve integrated systems that include people, materials, information, equipment and energy.

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

2. 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 MECHANICAL ENGINEERING AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Philippine Society of Mechanical Engineers

These program criteria will apply to all engineering programs with “mechanical engineering” in their titles.(See CHED CMO)

1. Curriculum

   The program must demonstrate that graduates have the ability to : apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations) to model, analyze, design, and realize physical systems, components or processes; and work professionally in both thermal and mechanical systems areas.

2. Faculty

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

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

Lead society: Society of Metallurgical Engineers of the Philippines

These program criteria apply to engineering programs with ”metallurgical engineering”,“materials engineering”, and/or “ceramic engineering” 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.

1. Curriculum

   The program must demonstrate that graduates have: the ability to apply advanced science (such as chemistry and physics) and engineering principles to materials systems implied by the program modified, e.g., ceramics, metals, polymers, composite materials, etc.; an integrated 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; the ability to apply and integrate knowledge from each of the above four elements of the field to solve materials selection and design problems,; the ability to utilize experimental, statistical and computational methods consistent with the program educational objectives.

2. Faculty

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

PROGRAM CRITERIA FOR
MINING ENGINEERING
AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Philippine Society of Mining Engineers

These program criteria apply to engineering programs with “mining engineering” in their titles.

1. Curriculum

The program must demonstrate that graduates have: the ability to apply mathematics through differential equations, calculus-based physics, general chemistry, and probability and statistics as applied to mining engineering problems applications; fundamental knowledge in the geological sciences including characterization of mineral deposits, physical geology, structural or engineering geology, and mineral and rock identification and properties; proficiency in statistics, dynamics, strength of materials, fluid mechanics, thermodynamics, and electrical circuits; proficiency 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; proficiency 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 lead to proficiency in geologic concepts, rock mechanics, mine ventilation, and other topics appropriate to the program objectives

2. 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
NAVAL ARCHITECTURE AND MARINE ENGINEERING
AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Society of Naval Architects and Marine Engineers

These program criteria apply to engineering programs with “naval architecture” and “marine engineering” in their titles.

1. Curriculum

The program must demonstrate that graduates have: the ability to apply probability and statistical methods to naval architecture and marine engineering problems; basic knowledge of fluid mechanics, dynamics, structural mechanics, material properties, hydrostatics, and energy/propulsion systems in the context of marine vehicles; familiarity with instrumentation appropriate to naval architecture and/or marine engineering.

2. 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.

ROGRAM CRITERIA FOR
SANITARY ENGINEERING
AND SIMILARLY NAMED ENGINEERING PROGRAMS

Lead Society: Philippine Society of Sanitary Engineers

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

1. Curriculum

The program must prepare graduates to be proficient in mathematics through differential equations, probability and statistics, calculus-based physics, general chemistry; an earth science, e.g., geology, meteorology, soil science relevant to the program of study; a biological science, e.g., microbiology, aquatic biology, toxicology, relevant to the program of study; fluid mechanics relevant to the program of study; introductory level knowledge of environmental issues associated with air, land, and water systems and associated environmental health impacts; conducting laboratory experiments and critically analyzing and interpreting data in more than one major environmental engineering focus area, e.g., air, water, land, environmental health; performing engineering design by means of design experiences integrated throughout the professional component of the curriculum; to be proficient in advances principles and practice relevant to the program objectives; understanding of concepts of professional practice and the roles and responsibilities of public institutions and private organizations pertaining to environmental engineering.

2. Faculty

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