Accreditation Criteria for Engineering-Technology Programs

Developed according to the Graduate Attribute Exemplars of the Sydney Accord

Version 2023

Common Criteria

Criteria Guide

Discipline Criteria

IABEE – Persatuan Insinyur Indonesia
website: iabee.or.id
e-mail: info@iabee.or.id

Document Control

The International Common Criteria and Criteria Guide version 2023 for Engineering Technology Programs have been approved for pilot accreditation by IABEE Executive Committee on 12 May 2023.

Contents

Common Criteria

Preamble

The Indonesian Accreditation Board for Engineering Education (IABEE) builds this set of Criteria using outcome-based education approach. All engineering technology programs seeking international accreditation from IABEE shall fulfill the following Criteria.

1. Orientation of the Graduate Competence

1.1. Program shall define the profile of graduates to be envisaged as autonomous professionals by considering country's potential resources, cultures, needs and interests.

1.2. Program shall inform its students and faculty with the envisaged autonomous professional profile and widely publicize it.

1.3. Program shall establish its expected Learning Outcomes which consist of abilities to utilize knowledge, skills, resources, and attitudes as described in the following (a) to (k) items to be acquired by the student at the time of completion of the study:

(a) an ability to identify and apply required knowledge of mathematics, natural sciences, computing, engineering fundamentals, and discipline-appropriate engineering specialties to defined and applied engineering procedures, processes, systems, or methodologies;

(b) an ability to identify, infer, formulate, research and evaluate literature, and analyse broadly-defined engineering problems achieving demonstrable conclusions using analytical tools appropriate to the discipline or area of specialization;

(c) an ability to design systems, components or processes to meet identified needs for solving broadly-defined engineering problems appropriate to the discipline with proper consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations;

(d) an ability to locate, select, and organize relevant data from codes, databases and literature, design and conduct experiments to provide valid conclusions in the investigation of broadly defined engineering problems;

(e) an ability to use and utilize all required resources and technologies and deal with their limitations, including prediction and modelling, to solve broadly-defined engineering problems;
(f) an ability to analyse and evaluate the impact of sustainable development when solving broadly defined engineering problems;
(g) an ability to consistently adhere to professional ethics and engineering technology practice norms including compliance with national and international laws, with respect for diversity and inclusion;
(h) an ability to function effectively in carrying out a variety of tasks, as an individual, and as a member or leader working in diverse, inclusive and multi-disciplinary teams with a variety of work settings;
(i) an ability to apply written, oral and graphic communications effectively and inclusively to a variety of broadly-defined communities and environments taking into account cultural, language and learning differences;
(j) an ability to apply engineering management principles to projects, either as a member or leader in a multidisciplinary team;
(k) an ability to recognize the demands for, and be able to perform: independent and lifelong learning and critical thinking

2. Learning Implementation

2.1. Curriculum

2.1.1. Curriculum shall include the following subject areas:
(a) Mathematics and discipline-specific natural sciences;
(b) Sub-discipline specific content;
(c) Information and communication technology;
(d) General education

2.1.2. Curriculum development shall consider input from Program stakeholders.

2.1.3. Curriculum shall indicate the structural relationship and contributions of the subject courses to fulfill Learning Outcomes. Procedures, including syllabus, shall be established, and documented so that the expected learning process can be implemented in a controlled way.

2.1.4. Curriculum shall ensure that the students are exposed to engineering practices and major design project experience using engineering standards and multiple realistic constraints based on knowledge and skills acquired in preceding course work.

2.2. Faculty

2.2.1. The Program shall provide necessary number, qualification, and competence of faculty members for performing learning process, including planning, delivering, evaluating, and continually improving its effectiveness in order to achieve the Learning Outcomes.

2.2.2. The Program shall ensure that faculty members are aware of the relevance and importance of their roles and contributions to the Learning Outcomes.

2.3. Students and Academic Atmosphere

2.3.1. The Program shall define and implement an entry standard for both new and transfer students, as well as transfer of credits.

2.3.2. Program shall define and implement ongoing monitoring of student progress and evaluation of student performance. Procedures of quality assurance shall be established to ensure that adequacy of standards is achieved in all assessments.

2.3.3. The Program shall create and maintain good academic atmosphere conducive to successful learning.

2.3.4. The Program shall promote co-curricular activities for character building and enhancing the students' awareness on the country's needs.

2.4. Facilities

Program shall ensure the availability, accessibility, and safety of facilities for effective functioning of the learning process and attainment of the Learning Outcomes.

2.5. Institutional Responsibility

2.5.1. The Program shall define and manage the process for the provision of the educational service, including education design, curriculum development and delivery, and assessment of learning.

2.5.2. The Program Operating Institution shall make efforts to establish resources, supporting service and cooperation with stakeholders on research, education and/or service to community with due consideration to existing local resources.

3. Assessment of the Learning Outcomes

3.1. The Program shall ensure that an effective assessment process of Learning Outcomes based on established performance indicators is implemented and maintained at planned intervals using appropriate methods.

3.2. The Program shall ensure that graduates of the program achieve all expected Learning Outcomes.

4. Continual Improvement

4.1. Based on Program Learning Outcomes assessment results, the Program shall perform an evaluation at planned intervals with output in the form of decisions to improve the effectiveness of the educational process and resources.

4.2. The Program shall maintain documents and records related to the implementation of evaluation, the results and their follow-up.

Criteria Guide

0. Preamble

The Indonesian Accreditation Board for Engineering Education (IABEE) establishes this set of Criteria using outcome-based education approach. All engineering education programs seeking international accreditation from IABEE shall fulfill the following Criteria.

0.1. IABEE Common Criteria (CC) are established as a framework to perform accreditation of higher education programs. These CC comprise of elements that must be fulfilled by the Study Program to be accredited.

0.2. Programs to be accredited are four-year engineering Bachelor Programs or other higher education programs which IABEE considers as equivalent.

0.3. The Program is not restricted to single Programs operated by a Department or Faculty. A Program may be formed and/or operated by multiple Departments or Faculties. Programs may include matriculated learning activities outside of its home campus, in conjunction with other higher education institutions.

0.4. In cases where multiple Programs of the same nomenclature are offered in multiple locations by the same Program-Operating Institution (such as Programs established according to the *Program Studi di luar Kampus Utama* (PSDKU) scheme as defined by the Indonesian Ministerial Regulation of *Peraturan Menteri Riset, Teknologi, dan Pendidikan Tinggi* No. 1/2017), evaluation by IABEE shall treat the parallel Programs as separate entities.

0.5. In cases where a program consists of multiple streams (such as regular, international, or path-transfer classes), Program Operating-Institution must explicitly mention the scope for which the evaluation of accreditation is requested. In addition, Program Operating-Institution must be able to make a clear distinction among the streams with regards to permanent records of the graduates, such as certificate and academic transcript.

0.6. The Program shall define the profile of autonomous professionals to be fostered, and define the knowledge, skills, and attitudes as Learning Outcomes that graduates are expected to master upon completion of their study.

0.7. The Program shall promote self-reliance, welfare, advancement, fairness, and justice for the national and global community in general, based on science, technology, culture and sustainable utilization of natural resources.

0.8. The Program is required to design the curriculum systematically to ascertain the achievement of Program Learning Outcomes. Student and faculty shall be made aware of these Learning Outcomes.

0.9. The Program must disclose its Learning Outcomes to the public. The Program is also required to engage in continual improvement and at the same time to consider the sustainability of operation.

0.10. Common Criteria consist of 4 elements, following the management approach of PDCA (Plan-Do-Check-Act) continual improvement cycle. Criterion 1 describes the orientation of the graduate competence, Criterion 2 explains the learning implementation, Criterion 3 explains the assessment of the expected Learning Outcomes, and Criterion 4 explains the continual improvements.

0.11. In addition to these Common Criteria, Program seeking for accreditation shall fulfill also the Category and Discipline Criteria, as well as eligibility requirements and accreditation policies stipulated in the Rules and Procedures of Evaluation and Accreditation (RPEA).

1. Orientation of the Graduate Competence

1.1. The Program shall define the profile of graduates to be envisaged as Autonomous Professionals by considering country's potential resources, cultures, needs and interests.

1.1.1. The Program is required to define the Profile of the Autonomous Professionals intended to foster as its educational objectives, by taking account of:

(1) Local and/or national resources, such as human and physical resources.
(2) Local and/or national wisdoms,
(3) Local and national needs and interests
(4) Traditions, vision, and mission of the education institution

1.1.2. The Program shall demonstrate the process of establishing and periodic reviewing of the Autonomous Professional Profiles, including the involvements of the stakeholders.

1.2. The Program shall inform its students and faculty of the envisaged Autonomous Professional Profile and widely publicize it.

1.2.1. The envisaged Autonomous Professional Profile shall be informed to students and faculty and made accessible to the general public.

1.3. The Program shall establish its expected Learning Outcomes which consist of abilities to utilize knowledge, skills, resources, and attitudes as described in the following (a) to (k) graduate competences to be acquired by the student at the time of completion of the study.

1.3.1. The Program shall establish its own Program Learning Outcomes based on the Autonomous Professional Profile to be acquired. The Learning Outcomes shall cover all graduate competences from (a) to (k) as referred to in Common Criteria 1.3, which are expressed in such a way to provide flexibility to Program. It is important to note that the Learning Outcomes shall also include Category and Discipline Criteria

1.3.2. The Program shall establish procedures to conduct periodic review of the Learning Outcomes.

1.3.a. An ability to identify and apply required knowledge of mathematics, natural sciences, computing, engineering fundamentals, and discipline-appropriate engineering specialties to defined and applied engineering procedures, processes, systems, or methodologies.

The program develops a learning context to build:

1.3.a.1. A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences.

1.3.a.2. Conceptually-based mathematics, including numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed consideration and use of models applicable to the sub-discipline.

1.3.a.3 A systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline.

1.3.a.4 Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline.

1.3.b. An ability to identify, infer, formulate, research and evaluate literature, and analyse broadly-defined engineering problems achieving demonstrable conclusions using analytical tools appropriate to the discipline or area of specialization.

1.3.b.1. Broadly-defined engineering problems have the characteristics as described in (1) and some or all of those in (2) to (7) below.

(1) *Depth of knowledge required*: Cannot be resolved without engineering knowledge at the level of one or more of 1) engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline, 2) knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations using the technologies of a practice area, and 3) knowledge of engineering technologies applicable in the sub-discipline supported by a systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline with a strong emphasis on the application of developed technology.

(2) *Range of conflicting requirements*: Involve a variety of conflicting technical and non-technical issues (such as ethical, sustainability, legal, political, economic,

societal) and consideration of future requirements.

(3) *Depth of analysis required*: Can be solved by application of well-proven analysis techniques and models.

(4) *Familiarity of issues*: Belong to families of familiar problems which are solved in well- accepted ways.

(5) *Extent of applicable codes*: Address problems that may be partially outside those encompassed by standards or codes of practice.

(6) *Extent of stakeholder involvement and conflicting requirements*: Involve different engineering disciplines and other fields with several groups of stakeholders with differing and occasionally conflicting needs.

(7) *Interdependence*: Address components of systems within complex engineering problems.

1.3.b.2. The program develops students to have the knowledge and attitude profile written in 1.3.a.1 to 1.3.a.4 in supporting the development of this learning outcome (1.3.b).

1.3.c. An ability to design systems, components or processes to meet identified needs for solving broadly-defined engineering problems appropriate to the discipline with proper consideration for public health and safety, whole-life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations.

1.3.c.1. The program shall develop knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations using the technologies of a practice area.

1.3.c.2. Broadly-defined Engineering Problems refer to 1.3.b.1.

1.3.d. An ability to locate, select, and organize relevant data from codes, databases and literature, design and conduct experiments to provide valid conclusions in the investigation of broadly defined engineering problems.

1.3.d.1. 1.3.d.1 The program shall engage students with the current technological literature of the discipline and develop awareness of the power of critical thinking.

1.3.d.2. Broadly-defined Engineering Problems refer to 1.3.b.1.

1.3.e. An ability to use and utilize all required resources and technologies and deal with their limitations, including prediction and modelling, to solve broadly-defined engineering problems.

1.3.e.1. The program develops students to have the knowledge and attitude profile written in 1.3.a.2 in supporting the development of this learning outcome (1.3.e)

1.3.e.2. Knowledge of engineering technologies applicable in the sub-discipline

1.3.e.3 Broadly-defined Engineering Problems refer to 1.3.b.1.

1.3.f. an ability to analyze and evaluate impacts to society, the economy, sustainability, health and safety, legal frameworks, and the environment, when solving broadly-defined engineering problems.

1.3.f.1. The program develops students to have the knowledge and attitude profile written in 1.3.a.1 and 1.3.c.1 in supporting the development of this learning outcome (1.3.f).

1.3.f.2. Knowledge of the role of technology in society and identified issues in applying engineering technology need to be developed, such as public safety and sustainable development.

1.3.f.3. Broadly-defined Engineering Problems refer to 1.3.b.1.

1.3.g. Ability to consistently adhere to professional ethics and engineering technology practice norms including compliance with national and international laws, with respect for diversity and inclusion.

1.3.g.1. The program needs to build student awareness about ethics, behaviour and inclusive behaviour; knowledge of professional ethics, responsibilities, and engineering practice norms; the need for diversity for reasons of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, as well as an inclusive attitude..

1.3.h. An ability to function effectively in carrying out a variety of tasks, as an individual, and as a member or leader working in diverse, inclusive and multi-disciplinary teams with a variety of work settings.

1.3.h.1. The program trains students to function effectively and be professionally responsible as individuals, and as members or leaders.

1.3.h.2. The program develops students to have the knowledge and attitude profile written in 1.3.g.1 in supporting the development of this learning outcome (1.3.h)

1.3.h.3. Multidiscipline circumstances may cover disciplines within engineering and non-engineering disciplines.

1.3.i. An ability to apply written, oral and graphic communications effectively and inclusively to a variety of broadly-defined communities and environments taking into account cultural, language and learning differences

1.3.i.1. This competence indicates the need of active and effective communication skills including being able to comprehend and write effective reports and design documentation, make effective presentations, taking into account socio-cultural, languages, and learning differences for the acceptability and workability of the implementation of engineering works.

1.3.i.2. These oral and written communications should include the use of engineering standards.

1.3.i.3. The Program shall ensure that a measurable portion of the oral and/or written communications involve the use of internationally recognized languages.

1.3.i.4. Broadly-defined Engineering Problems refer to 1.3.b.1.

1.3.j. An ability to apply engineering management principles to projects, either as a member or leader in a multidisciplinary team

1.3.j.1. The engineering project manager's functions include planning, organizing, leading, operating, and controlling.

1.3.j.2. Engineering project management utilizes a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity, and adopts a holistic and proportionate approach to the mitigation of security risks.

1.3.j.3. The program develops students to have the knowledge and attitude profile written in 1.3.h.1 in supporting the development of this learning outcome (1.3.j).

1.3.j.4. Multidiscipline circumstances may cover disciplines within engineering and non-engineering disciplines.

1.3.k. An ability to recognize the demands for, and be able to perform: independent and lifelong learning and critical thinking

1.3.k.1. The program develops students to have the knowledge and attitude profile written in 1.3.d.1 in supporting the development of this learning outcome (1.3.k)

1.3.k.2. Students are educated in the program to become familiar with independent, continuous learning, and the needs of critical thinking skills through lectures, applied research, experiments, project/product/ problem-based learning, practical exercises, exercises and assignments.

1.3.k.3. This competency refers to an understanding of the need for continuous professional development, obtaining up-to-date information and knowledge, and an awareness of the importance of knowledge sharing.

2. Learning Implementation

2.1. Curriculum

2.1.1. Curriculum of the Program shall include the following subject areas:

a) Mathematics and sub-discipline specific natural sciences

b) Sub-discipline specific content

c) Information and communication technology

d) General education

2.1.1.1. The Program shall ensure that the curriculum meets the above mentioned subject areas appropriate to engineering technology regardless of the subject/course names. The Program must ensure that the curriculum devotes adequate attention and time to each component, consistent with the Program Learning Outcomes, which include (expressed as percentage of total coursework load in semester credits (SKS)):

- Mathematics: The program must develop the ability of students to apply mathematics to the solution of technical problems.
- Sub-discipline specific natural sciences: The sub-discipline specific natural sciences content of the curriculum must be appropriate to the discipline and must include laboratory experiences.
- At least 65% of the total credits is sub-discipline specific content, and information and communication technology. The sub-discipline specific content of the curriculum must focus on the applied aspects of science and engineering and must:
  (1) include a technical core preparing students fo r the increasingly complex technical specialties later in the curriculum;
  (2) develop student competence in the sub-discipline;
  (3) utilize and develop information and communication technology capabilities;

(4) include design considerations appropriate to the discipline and degree level such as: industry and engineering standards and codes; public safety and health; and local and global impact of engineering solutions on individuals, organizations and society; and

(5) combine technical, professional, and general education components to prepare students for a career, further study, and lifelong professional development.

- Maximum 25% of the total credits is general education. The curriculum must include topics related to professional and ethical responsibilities, diversity and inclusion awareness, quality, management, communication, and continuous improvement.
- The Integration of Content: The curriculum must provide an integrating experience that develops student competencies in applying both technical and non-technical skills in solving problems, such as through project/product/problem-based learning, and/or capstone design project.

2.1.2. Curriculum development shall consider input from Program stakeholders.

2.1.2.1. The Program shall demonstrate how to develop the curriculum and to assure the requirement of the society, industry, and professional fields.

2.1.2.2. There must be a documented, systematically utilized, and effective procedure describing the way to meet the need of stakeholders and to review the curriculum periodically to ensure its consistency with the institutional mission, the stakeholders needs, and these criteria.

2.1.2.3. The Program shall provide sufficient opportunity for the stakeholders to discuss Program Educational Objectives/Profile of Autonomous Professionals, and to foster closer collaboration.

2.1.3. The Curriculum must indicate the structural relationship and contributions of the subject courses to fulfill Learning Outcomes. Curriculum, including complete syllabus, shall be established, and documented to ensure the expected learning process can be implemented in a controlled way

2.1.3.1. The Program shall describe how the curriculum content and structure are aligned for systematic learning and assessment mapping to enable the attainment of Program Learning Outcomes by students.

2.1.3.2. The Program shall describe how specific requirements of each curricular area in Common Criteria or Discipline Criteria can be met, both in terms of load and depth of the curricular content.

2.1.3.3. The Program shall establish syllabi for all courses designed to satisfy mathematics, science, and discipline-specific requirements or any applicable criteria.

2.1.3.4. The Program is required to implement educational activities for students to achieve its Program Learning Outcomes.

2.1.3.5. The Program is required to systematically design the curriculum to enable achievement of the expected Program Learning Outcomes within the intended period of study.

2.1.3.6. The Program is required to adequately inform the faculty and students through various means such as guidebooks, orientation programs etc. about the curriculum, and how the Program Learning Outcomes will be attained through the learning process.

2.1.4. Curriculum shall ensure that the students are exposed to engineering technology practices and major design project experience using engineering standards and multiple realistic constraints based on knowledge and skills acquired in preceding course work.

2.1.4.1. The Program must provide opportunity to students to develop competence in practical application of engineering skills, combining theory and experience along with the use of other relevant knowledge and skills. Training in engineering technology practices may be supported by several courses (subjects), but should culminate in a major project. This major project serves as a capstone for the program which requires students to integrate knowledge and skills acquired in earlier coursework.

2.1.4.2. The Program shall define curriculum subjects to optimally support mainstream discipline-specific requirements and enable students to acquire practical experience in implementing the subjects in an actual working environment.

2.2. *Faculty*

2.2.1. The Program shall provide necessary number, qualification, and competence of faculty members for performing learning process, including planning, delivering, evaluating, and continually improving its effectiveness in order to achieve the Learning Outcomes.

2.2.1.1. The Program shall describe qualifications of the faculty and their adequacy to cover all curricular areas and to meet any applicable criteria.

2.2.1.2. This description shall include the composition, size, experience and the extent and quality of faculty member involvement in interactions with students, student advising, and oversight of the Program.

2.2.1.3. The Program shall provide detailed descriptions of professional development activities for each faculty member and how activities such as sabbaticals, travel, workshops, seminars, etc., are planned and supported.

2.2.2. The Program shall ensure that faculty members are aware of the relevance and importance of their roles and contributions to the Learning Outcomes.

2.2.2.1. The Program shall describe the role played by the faculty with respect to the course creation, modification, and evaluation, and with respect to the definition, revision, and attainment of the Learning Outcomes.

2.2.2.2. The Program shall have a method to institutionally develop and evaluate faculty educational activities.

2.2.2.3. The Program shall define and set up communication network among faculty members for close collaboration among the courses set in the curriculum to obtain better educational results.

2.3. Students and Academic Atmosphere

2.3.1. The Program shall define and implement an entry standard for both new and transfer students, as well as transfer of credits.

2.3.1.1. The Program shall establish written policies on student admission, covering the requirements and the process for accepting new students into Program, including information on how Program ensures and documents that students are meeting prerequisites and how it handles cases where prerequisite have not been met.

2.3.1.2. The Program shall describe the requirements and process for accepting transfer students and transfer credits.

2.3.2. Program shall define and implement ongoing monitoring of student progress and evaluation of student performance. Procedures of quality assurance shall be established to ensure that adequacy of standards is achieved in all assessments.

2.3.2.1. The Program shall establish policies and procedures to monitor students' progress and performance

2.3.2.2. The Program shall document the process by which student performance is monitored.

2.3.3. The Program shall create and maintain good academic atmosphere conducive to successful learning.

2.3.3.1. The Program shall develop supporting activities to create and maintain good academic atmosphere for learning, such as by providing student guidance and counseling on academic as well as non-academic aspects and career guidance.

2.3.3.2. The Program shall describe the process for advising and providing career guidance to students, how often students are advised, and who provides the advising.

2.3.4. The Program shall promote co-curricular activities for character building and enhancing the students' awareness on the country's needs.

2.3.4.1. The Program shall create and maintain various co-curricular activities particularly to improve the student soft skills, such as conducting *studium generale*, involving student in faculty research projects, and participating in scientific forums.

2.3.4.2. An entrepreneurial spirit as characterized by a deep sense of purpose, perseverance, resourcefulness, open-mindedness, and eagerness to learn shall be emphasized in the learning process.

2.4. Facilities

2.4.1. Program shall ensure the availability, accessibility, and safety of facilities for effective functioning of the learning process and attainment of the Learning Outcomes.

2.4.1.1. The Program shall describe the facilities in terms of their ability to support the attainment of the Learning Outcomes and to provide an atmosphere conducive to learning, such as:

- offices (such as administrative, faculty, clerical, and teaching assistants) and any associated equipment,
- classrooms and associated equipment,
- in house laboratory facilities including those containing computers (describe available hardware and software) and the associated tools and equipment that support instruction, and field laboratory whenever necessary
- computing resources (workstations, servers, storage, networks including software)
- library services.

2.4.1.2. The Program shall describe and assess the adequacy of these facilities to support the scholarly and professional activities of the students and faculty.

2.4.1.3. The Program shall manage safety, health, and environment to ensure safe and appropriate utilization of tools, equipment, computing resources, laboratories, and other physical facilities.

2.4.2. The Program shall establish policy and procedures for maintaining and upgrading the tools, equipment, computing resources, laboratories, library, and other facilities used by students and faculty

2.4.2.1. The Program shall describe the policy and procedures for maintaining and upgrading the tools, equipment, computing resources, laboratories, library, and other facilities used by students and faculty.

2.5. Institutional Responsibility

2.5.1. The Program shall define and manage the process for the provision of the educational service, including education design, curriculum development and delivery, and assessment of learning.

2.5.1.1. The Program shall describe the governance of the program and its adequacy to ensure the quality and continuity of the program and how the leadership is involved in decisions that affect the Program.

2.5.1.2. The Program shall describe the process used to establish the program's budget and provide evidence of continuity of institutional support for the program, including the sources of financial support for both permanent (recurring) and temporary (one-time) funds.

2.5.1.3. The Program shall describe how teaching is supported by the institution in terms of graders, teaching assistants, teaching workshops, etc.

2.5.1.4. The Program shall describe the adequacy of the staff (administrative, instructional, and technical) and institutional services provided to the Program.

2.5.2. The Program Operating Institution (POI) shall make efforts to establish resources, supporting service and cooperation with stakeholders on research, education and/or service to community with due consideration to existing local resources.

2.5.2.1. The POI shall make efforts to develop partnership with external institutions such as industry, research centers, and community units to foster the *Tridharma* (learning, research, and community engagement). The institution hosting the Program shall demonstrate the support to these efforts.

2.5.2.2. The improvement of the students' learning process through the engagement of academia, business, and/or the government in the development of local region through the use of local resources is viewed as a particular advantage of the Program.

3. Assessment of the Learning Outcomes

3.1. The Program shall ensure that an effective assessment process of Learning Outcomes based on established performance indicators is implemented and maintained at planned intervals using appropriate methods.

3.1.1. The Program shall define for each Learning Outcome the relevant performance indicators and appropriate assessment method as the basis for measuring achievements of these indicators.

3.1.2. A complete and clearly documented method and procedure for measuring the achievement of Learning Outcomes shall be established.

3.1.3. The assessment of each learning outcome shall be conducted at planned interval.

3.2. The Program shall ensure that graduates of the program achieve all expected Learning Outcomes.

3.2.1. The Program shall maintain effective policy and procedures to ensure that its graduates meet all graduation requirements.

3.2.2. The process and results of graduation requirement review shall be documented, and the records are maintained as evidence that all graduates have been evaluated and that all Program Learning Outcomes have been fulfilled.

3.2.3. The Program shall have written policies and procedures on how handle non-performing students and how to terminate students who are not able to complete their study.

4. Continual Improvement

4.1. Based on Program Learning Outcomes assessment results, the Program shall perform an evaluation at planned intervals with output in the form of decisions to improve the effectiveness of the educational process and resources.

4.1.1. To ensure the continual improvement, the Program shall run its educational activities by implementing a quality assurance system follows the P-D-C-A cycle as described in the preamble.

4.1.2. The evaluation shall be based on assessment of the Program Learning Outcomes attainment. The output of the evaluation shall contain recommendations on the improvement of learning materials, methods of delivery and other educational processes, suitability, and adequacy of the Learning Outcomes with regards to the needs of stakeholders, and resources.

4.1.3. The evaluation shall be carried out at planned intervals following a method and procedure made well-known to the faculty. The evaluation method and procedure shall be designed to enable the identification of constraints and root causes of problems, and therefore resulting in opportunities for improvement.

4.2. The Program shall maintain documents and records related to the implementation of evaluation, the results, and their follow-up.

4.2.1. A documented procedure for the implementation of Program evaluation shall be established.

4.2.2. The documentation of evaluation implementation, its results and its follow-up shall be maintained and accessible to the faculty. These records provide evidence that evaluation has been conducted, the results have been implemented and periodic improvement has been achieved, thereby signifying the implementation of P-D-C-A cycle.

Discipline Criteria

Discipline Criteria for Chemical, Biochemical, Biomolecular Engineering Technology Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Kimia Persatual Insinyur Indonesia* (BKK-PII) – PII College for Chemical Engineers

Version: 2022

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

Curriculum

The curriculum must provide bachelor's applied engineering degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in chemical engineering technology. Graduates of bachelor's applied engineering programs build on the strengths of associate degree programs by gaining the knowledge, skills, and abilities for careers in process design and management. The following curriculum topics are required:

a. operating principles (including testing and troubleshooting) of chemical processes and equipment in accordance with applicable safety (including process hazards), health and environmental standards.
b. application of chemical engineering principles (such as fluid mechanics, material and energy balances, heat transfer, reactions, thermodynamics, and separations) to the design, improvement, and operation of chemical processes and appropriate to program educational objectives.
c. application of instrumentation and process control, quality control, computer applications, and materials of construction to the design, improvement, and operation of chemical processes.
d. chemistry with laboratory experience and coursework topics in both inorganic and organic chemistry; and
e. application of statistical process and quality control to chemical operations.

Discipline Criteria for Civil Engineering Technology and Similarly-named Programs

Lead Society(ies):

- *Badan Kejuruan Sipil Persatual Insinyur Indonesia* (BKS-PII) – PII College for Civil Engineers

Version: 2022

These program criteria apply to engineering technology programs that include civil or similar modifiers in their titles. Graduates of civil engineering technology programs will have the technical and managerial skills necessary to enter careers in the planning, design, construction, operation or maintenance of the built environment and global infrastructure.

Curriculum

Graduates of applied bachelor's degree programs typically analyze and design systems, specify project methods and materials, perform cost estimates and analyses, and manage technical activities in support of civil engineering projects. The curriculum must provide instruction in the following curricular areas:

a. utilization of principles, hardware, and software that are appropriate to produce drawings, reports, quantity estimates, and other documents related to civil engineering.

b. performance of standardized field and laboratory tests related to civil engineering.

c. utilization of surveying methods appropriates for land measurement and/or construction layout.

d. application of fundamental computational methods and elementary analytical techniques in sub-disciplines related to civil engineering.

e. planning and preparation of documents appropriate for design and construction.

f. performance of economic analyses and cost estimates related to design, construction, operations, and maintenance of systems associated with civil engineering.

g. selection of appropriate engineering materials and practices; and

h. performance of standard analysis and design in at least three sub-disciplines related to civil engineering.

Faculty

Faculty members teaching courses on design should have either certification of professional engineer or qualification through experience in engineering technology design and practices.

Discipline Criteria for Construction Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Sipil Persatual Insinyur Indonesia* (BKS-PII) – PII College for Civil Engineers

Version: 2022

These program criteria apply to engineering technology programs that include construction or similar modifiers in their titles. Graduates of construction engineering technology programs will have the technical skills necessary to enter careers in construction, operation and/or maintenance of the built environment and global infrastructure.

Curriculum

Graduates of applied bachelor's degree programs typically specify project methods and materials, perform cost estimates and analyses, and manage construction activities. The curriculum must provide instruction in the following curricular areas:

a. utilization of techniques that are appropriate to administer and evaluate construction contracts, documents, and codes.
b. estimation of costs, estimation of quantities, and evaluation of materials for construction projects.
c. utilization of measuring methods, hardware, and software that are appropriate for field, laboratory, and office processes related to construction.
d. application of fundamental computational methods and elementary analytical techniques in sub-disciplines related to construction engineering.
e. production and utilization of documents related to design, construction, and operations.
f. performance of economic analyses and cost estimates related to design, construction, and maintenance of systems associated with construction engineering.
g. selection of appropriate construction materials and practices.
h. application of appropriate principles of construction management, law, and ethics; and
i. performance of standard analysis and design in at least one sub-discipline related to construction engineering.

Discipline Criteria for Earth and Energy Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* (BKTE PII) – PII College for Electrical Engineers

Version: 2022

Curriculum

The program shall prepare graduates to be proficient in applied mathematics and natural sciences relevant to earth and energy engineering, such as geological engineering, geophysical engineering, or other scope related to earth and energy engineering mapping, in conducting earth and energy engineering data acquisition, data processing and interpretation for experiments and research toward design and planning of engineering or exploration purpose, in which it integrates all professional components in the curriculum. The program shall also prepare graduates to explain basic concepts in management, business, public policy, and leadership, and explain the importance of ethics and professional licensure.

Faculty

Faculty members teaching courses should have either certification in related earth and energy engineering professions, or professional engineer or qualification through experience in engineering practice.

Discipline Criteria for Electrical/Electronic(s) Engineering Technology and Similarly-named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* (BKTE PII) – PII College for Electrical Engineers

Version: 2022

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

Curriculum

The curriculum must provide applied bachelor's degree graduates with instruction in the knowledge, techniques, skills and use of modern tools necessary to enter careers in the design, application, installation, manufacturing, operation and/or maintenance of electrical/electronic(s) systems. Graduates of applied bachelor's degree programs are well prepared for development and implementation of electrical/electronic(s) systems. Given the breadth of technical expertise involved with electrical systems, and the unique objectives of individual programs, some applied bachelor's 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 applied bachelor's graduates must be appropriate to support the program educational objectives.

The curriculum must include the following topics:

a. application of circuit analysis and design, computer programming, associated software, analog and digital electronics, microcontrollers, and engineering standards to the building, testing, operation, and maintenance of electrical/electronic(s) systems.
b. application of natural sciences and mathematics at or above the level of trigonometry to the building, testing, operation, and maintenance of electrical/electronic systems.
c. analysis, design, and implementation of one or more of the following: control systems, instrumentation systems, communications systems, computer systems, power systems or energy systems.
d. application of project management techniques to electrical/electronic(s) systems; and
e. utilization of differential and integral calculus, as a minimum, to characterize the performance of electrical/electronic systems.

Discipline Criteria for Occupational Safety and Healthcare Engineering Technology and Similarly-named Programs

Lead Society(ies):

TBA

Version: 2022

These program criteria apply to engineering technology programs that include healthcare, bioengineering, biomedical, biomedical equipment, clinical technology, medical equipment, medical electronics, or similar modifiers in their titles. An accreditable program in healthcare engineering technology will prepare graduates with the technical skills necessary to enter careers to work with clinicians and other healthcare professionals as part of a team to ensure the highest standards and best practices in medical device safety, security, interoperability, and functionality, general industry, construction, environmental problems, marine transportation and others, product design, insurance loss control, fire and property protection, and the healthcare industry.

Curriculum

The curriculum must provide applied bachelor's degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in healthcare engineering technology. Applied bachelor's degree graduates typically support the use of medical devices in healthcare, focusing on selecting safe and effective medical equipment, maintenance of medical equipment and systems, contribute toward improving patient outcomes, educating clinical staff, and controlling costs through financial stewardship.

The curriculum for applied bachelor's degree programs must include analog and digital electronics, medical device principles, applicable codes and regulations, medical vocabulary, the structure and function of the human body, an internship at a clinical site, as well as IT concepts including computers, peripherals, networks, cybersecurity, and software. In addition, applied bachelor's degree curriculum must include asset management, imaging modality fundamentals, clinical laboratory equipment fundamentals, risk analysis, and process improvement. The curriculum must include the following curricular areas:

a. an aptitude for math and science, an analytical mind, and problem-solving and communication skills.
b. analyzing capability for; operating procedures, materials, machines, and conditions at work sites to determine risks of injury, occupational disease and damage to property and equipment.
c. the interaction of medical equipment with the human body.
d. the principles of medical equipment, safety and operational tests, the use of test results to improve processes and ensure that equipment is functioning properly and safely with appropriate documentation.

e. the clinical application of computer networks, networking protocols, and medical device interoperability including data security and privacy standards.
f. potential unsafe conditions related to the use of medical equipment and systems, preventative and corrective actions including risk mitigation.
g. technology utilized in specialized clinical areas such as patient imaging and the operating room, including the interconnectedness (connectivity) of medical devices and systems.
h. the principles of project management to the healthcare setting; and
i. the financial information associated with the process of clinical equipment acquisition, management and support including budgeting and life-cycle planning.

Discipline Criteria for Information, Information Security, Cyber Security, Information Assurance Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Informatika Persatuan Insinyur Indonesia* (BKTI PII) – PII College for Informatics Engineers
- *Asosiasi Pendidikan Tinggi Informatika dan Komputer* (APTIKOM)

Version: 2022

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

Curriculum

The curriculum must provide graduates with instruction in the knowledge, techniques, skills, and use of modern tools 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 of applied bachelor's degree programs in Information Engineering Technology are well prepared for design, development, and management of computer systems, networks, and telecommunication systems. Graduates of applied bachelor's degree programs that contain the modifier "information security," "cybersecurity" or "information assurance" in the title will also be well prepared for design of secure systems, evaluation, and measurement of security risk, and ensure proper levels of privacy are maintained.

Given the breadth of technical expertise involved with information systems, and the unique objectives of individual programs, some applied bachelor's programs may provide instruction with in-depth but narrow focus, while other programs may choose to provide instruction in a broad spectrum of the field. The curriculum must include instruction in the following topics:

a. 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. application of electrical, electronic, telecommunications, and digital signal propagation fundamentals in the building, testing, operation, and maintenance of hardware and software systems.
c. application of legal, ethical and security issues involving data and information.
d. design, implementation, maintenance, and security of facilities involved with the processing and transfer of information.
e. application of project management techniques to facilities that process and transfer information; and
f. utilization of discrete mathematics, and probability and statistics in the support of facilities that process and transfer information.

The curriculum for programs containing the modifiers “information security,” “cybersecurity” or “information assurance” in the title must also include instruction in the following topics:

a. application of cybersecurity principles, techniques, and tools to protect devices and systems that incorporate interconnected hardware and software, and human aspects of a system.
b. design, implementation, maintenance, and security of facilities involved with the processing and transfer of data and information; and
c. procurement, testing analysis and maintenance of components interconnected into larger systems.

Faculty

Program faculty members must understand professional practice and maintain currency in their respective professional areas.

Discipline Criteria for Instrumentation and Control Systems Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* (BKTE PII) – PII College for Electrical Engineers
- *Badan Kejuruan Teknik Mesin Persatuan Insinyur Indonesia* (BKTM PII) – PII College for Electrical Engineers

Version: 2022

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

Curriculum

The curriculum must provide applied bachelor's degree graduates with instruction in 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. Applied bachelor's degree graduates have strengths to undertake the design and specification of control systems and for the subsequent management of their installation and operation.

The following curricular areas are required:

a. concepts of automatic control, including measurement, feedback, and feedforward regulation for the operation of continuous and discrete systems.
b. design and implementation of systems utilizing analog and/or digital control devices.
c. concepts of chemistry, physics, and electricity/electronics to measurement and control systems.
d. concepts of digital and microprocessor systems and functionality of system components/devices for the automation of processes.
e. concepts of measurements and sensor selection.
f. communicating the technical details of control systems using current techniques and graphical standards.
g. concepts of mechanics, fluid mechanics, and heat transfer to the design of process control systems.
h. utilization of programmable logic controllers (PLC), distributed control systems (DCS) and supervisory control systems for control of manufacturing and processing systems; and
i. utilization of modern and effective management skills for performing investigation analysis, and synthesis in the implementation of automatic control systems.

Faculty

Program faculty members must understand professional practice and maintain currency in their respective professional areas.

Discipline Criteria for Manufacturing Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Industri Persatuan Insinyur Indonesia* (BKTI PII) – PII College for Electrical Engineers

Version: 2022

These program criteria apply to engineering technology programs that include manufacturing or similar modifiers in their titles. An accreditable degree program in manufacturing engineering technology will provide graduates with instruction in technical and leadership skills necessary for manufacturing competitiveness and to enter careers in manufacturing process and systems design, operations, quality, continuous improvement, lean manufacturing, and sustainability. Level and scope of career preparation will depend on the degree level and specific program orientation as portrayed by its program educational objectives.

Curriculum

The curriculum must provide applied bachelor's degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in manufacturing engineering technology. Applied bachelor's degree graduates build on the strengths of associate degree programs by gaining the knowledge, skills, and abilities for entry into manufacturing careers practicing various tools, techniques, and processes. The depth and breadth of expertise demonstrated by applied bachelor's graduates must support the program educational objectives. The curriculum must include instruction in the following topics:

a.materials and manufacturing processes.

b. product design process, tooling, and assembly.
c. manufacturing systems, automation, and operations.
d. statistics, quality and continuous improvement, and industrial organization and management; and
e. capstone or integrating experience that develops and illustrates student competencies in applying both technical and non-technical skills in successfully solving manufacturing problems.

Faculty

Program faculty members must understand professional practice and maintain currency in their respective professional areas.

Discipline Criteria for Mechatronics, Robotics Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* (BKTE PII) – PII College for Electrical Engineers
- *Badan Kejuruan Teknik Mesin Persatuan Insinyur Indonesia* (BKTM PII) – PII College for Electrical Engineers

Version: 2022

These program criteria apply to engineering technology programs that include mechatronics, or similar modifiers in their titles. An accreditable program prepares graduates, through specialized curriculum, with the necessary knowledge and skills to meet the needs of the constituents that they serve.

Curriculum

The curriculum must prepare applied bachelor's degree graduates with skills necessary to enter careers in the associated industries such as robotics, automotive, advanced manufacturing, and automation. Through the inclusion of specialized curricula, graduates of applied bachelor's degree programs are prepared to apply their knowledge in the occupational areas of: specifying, designing, building, testing, installing, documenting, operating, or maintaining basic mechatronics systems. Given the breadth of technical expertise involved with knowledge and use of modern equipment in mechatronics engineering technology, and the unique objectives of individual programs, some applied bachelor's 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 applied bachelor's graduates must be appropriate to support the educational objectives of the program. The following curricular areas are required:

a. Mechatronics component and system integration; tooling and assembly (with respect to digital and analog electrical components and circuits; embedded systems and control; mechanics (statics and dynamics); pneumatic, hydraulic, industrial controls; automation and PLCs).
b. Mechatronics systems software analysis tools, programming, and control systems engineering; connectivity, industrial communication protocols and information security.
c. Design, selection, set-up, and calibration of measurement tools, instrumentation, and sensors.
d. Troubleshooting of mechatronics system including test and adjust, maintenance or repair.
e. Preparation of laboratory reports and systems integration, drawings associated with development, installation, or maintenance of mechatronics components and systems.

f. Familiarity and use of industry codes, specifications, and standards.
g. Statistics, quality and continuous improvement techniques, and industrial organization and management.
h. Capstone or integrating experience that illustrates skills acquired in the program applying both technical and non-technical skills in successfully solving industrial mechatronics problems.

Discipline Criteria for Software Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Informatika Persatuan Insinyur Indonesia* (BKTI PII) – PII College for Informatics Engineers
- *Asosiasi Pendidikan Tinggi Informatika dan Komputer* (APTIKOM)

Version: 2022

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

Curriculum

The curriculum must provide graduates with instruction in the knowledge, techniques, skills, and use of modern tools necessary to enter careers in the software modeling and analysis, requirements analysis and specification, software design, software verification & validation, software process, software quality, and security. Graduates of baccalaureate degree programs in Software Engineering Technology are well prepared for problem identification and analysis, software design, development, implementation, verification, and documentation.

Given the breadth of technical expertise involved with software, and the unique objectives of individual programs, some baccalaureate programs may provide instruction with in-depth but narrow focus, while other programs may choose to provide instruction in a broad spectrum of the field. The curriculum must include instruction in the following topics:

a. computing essentials.
b. mathematical and engineering fundamentals.
c. professional practice.
d. software modeling and analysis.
e. requirements analysis and specification.
f. software design.
g. software verification & validation.
h. software process.
i. software quality; and
j. security.

Faculty

Program faculty members must understand professional practice and maintain currency in their respective professional areas.

Discipline Criteria for Telecommunications Engineering Technology and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* (BKTE PII) – PII College for Electrical Engineers

Version: 2022

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

Curriculum

The curriculum must enable the program to provide graduates with instruction in the knowledge, techniques, skills, and use of modern tools necessary to enter careers in design, application, installation, management, operation, and/or maintenance of telecommunications systems. Graduates of applied bachelor's degree programs are well prepared for development and implementation of telecommunications systems. Given the breath of technical expertise involved with telecommunication systems, and the unique objectives of individual programs, some applied bachelor's programs may provide instruction with an in-depth but narrow expertise, while other programs may choose to provide instruction in a broad spectrum of the fields. The curriculum must include instruction in the following topics:

a. application of electric circuits, computer programming, associated software applications, analog and digital electronics, voice and data communications and engineering standards, and the principle of telecommunications systems in the solution of telecommunications problems.
b. application of natural sciences and mathematics at or above the level of algebra and trigonometry to the building, testing, operation, and maintenance of telecommunication systems.
c. analysis, design, and implementation of telecommunications systems.
d. application of project management techniques in the design, maintenance, and implementation of telecommunication systems.
e. analysis, and implementation of switching technologies, wired and wireless networking technologies, and policy.
f. management, design, and planning of telecommunication and computer networks; and
g. utilization of statistics/probability, transform methods, or applied differential equations in support of telecommunication systems and computer networks.

Discipline Criteria for Engineering Technology and Similarly Named Programs

These program criteria apply to engineering technology programs without modifiers in their titles. There are no program-specific criteria beyond the General Criteria.

Curriculum
No additional requirement beyond those required by the Common Criteria

Faculty
No additional requirement beyond those required by the Common Criteria