# Accreditation Criteria for Engineering-Technology Programs

**Developed according to the Graduate Attribute Exemplars of the Sydney Accord**

**Version 2024**

Common Criteria & Critreria Guide

Discipline Criteria

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# Document Control

The Accreditation Criteria for Engineering-Technology Programs version 2024, which consist of the Common Criteria & Criteria Guide and the Discipline Criteria have been approved by the Executive Committee on 5 July 2024 to be used for accreditation from 2025-2026 Evaluation Cycle onward.

# Contents

# Common Criteria & Criteria Guide

## 0. Preamble

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

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

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

0.3. P-D-C-A cycle is a continued process for quality improvement. In the Plan step, a way to effect improvement is developed. In the Do step, the plan is carried out. In the Check step, a study takes place between what was predicted and what was observed in the previous step. In the Act step, action is taken on the causal system to effect the desired change.

0.4. Programs to be accredited are four-year engineering technology programs or other higher education programs which IABEE considers equivalent.

0.5. 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.

0.6. In cases where multiple Programs of the same nomenclature are offered in multiple locations by the same Program-Operating Institution (such as those established as *Program Studi di luar Kampus Utama* (PSDKU) as defined by the Indonesian Ministerial Regulation of Indonesian Education and Culture Ministerial Regulation No. 7/2020), evaluation by IABEE shall treat the parallel Programs as separate entities.

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

0.8. The Program should 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.

0.9. In addition to Common Criteria and Criteria Guide, Program seeking for accreditation shall fulfill the Discipline Criteria, eligibility requirements, and other accreditation policies stipulated in the Rules and Procedures of Evaluation and Accreditation (RPEA).

# 1. Orientation of Professional Profile and Graduate Competence

**1.1. The Program shall establish the Autonomous Professional Profile (PPM) to be envisaged as its educational objective, which is based on the internal and external context, taking into account resources, stakeholder input, local and national needs and interests.**

1.1.1. The Program is required to define the Autonomous Professional Profile (PPM) intended to foster as its educational objectives based on internal and external context, for example vision, mission and values, strategic direction, performance and maturity, resources, relevance, economic and technological trends, standards and regulations, and globalization

1.1.2. The PPM shall describe the professional qualifications and attributes the Program envisages for its graduates to achieve in the early years of their professional career.

**1.2. Based on the envisaged PPM, the Program shall determine the Graduate Learning Outcomes (CPL) that shall be mastered by students upon completion of their studies. The CPL shall cover aspects of knowledge, skills, and attitudes with the level of depth and breadth as described in the graduate competencies in the following items (a) to (k), as well as additional competencies required by Discipline Criteria (if any).**

1.2.1. The Program shall establish its own Graduate Learning Outcomes (CPL) based on the PPM to be realized. The CPL shall be mastered by students upon completion of their studies.

1.2.2. The CPL shall cover aspects of knowledge, skills, and attitudes with the level of depth and breadth as described in the graduate competencies in the following articles of 1.2.a to 1.2.k

1.2.3. The CPL established by the Program shall cover additional outcomes required by the Discipline Criteria relevant to the Program, if any.

**1.2.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.**

1.2.a.1. The Program develops a learning context to build:

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

(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.

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

(4) engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline.

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

1.2.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

(i) engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline,

(ii) 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

(iii) knowledge of engineering technologies applicable in the sub-discipline supported by a systematic, theory-based formulation of engineering fundamentals 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 (e.g. 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 or occasionally conflicting needs.

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

1.2.b.2. The Program develops students to have the knowledge and attitude profile written in 1.2.a.1 in supporting the development of this learning outcome (1.2.b).

**1.2.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 resources, cultural, societal, and environmental considerations.**

1.2.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.

1.2.c.2. Broadly-defined Engineering Problems are described in article 1.2.b.1.

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| **1.2.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.** | 1.2.d.1. The Program shall engage students with the current technological literature of the discipline and develop awareness of the power of critical thinking.<br>1.2.d.2. Broadly-defined Engineering Problems are described in article 1.2.b.1. |
| **1.2.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.** | 1.2.e.1. The Program develops students to have the knowledge and attitude profile written in 1.2.a.1 in supporting the development of this learning outcome (1.2.e)<br>1.2.e.2. Knowledge of engineering technologies applicable in the sub-discipline<br>1.2.e.3 Broadly-defined Engineering Problems are described in article 1.2.b.1. |
| **1.2.f. an ability to analyze and evaluate impacts on society, the economy, sustainability, health and safety, legal frameworks, and the environment, when solving broadly-defined engineering problems.** | 1.2.f.1. The Program develops students to have the knowledge and attitude profile written in 1.2.a.1 in supporting the development of this learning outcome (1.2.f).<br>1.2.f.2. Knowledge of the role of technology in society and identify issues in applying engineering technology need to be developed, such as public safety and sustainable development.<br>1.2.f.3. Broadly-defined Engineering Problems are described in article 1.2.b.1 |
| **1.2.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.** | 1.2.g.1. The Program needs to build student awareness about ethics, behavior and inclusive behavior; 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. |

**1.2.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.**

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

1.2.h.2. The Program develops students to have the knowledge and attitude profile written in 1.2.g.1 in supporting the development of this learning outcome (1.2.h).

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

**1.2.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**

1.2.i.1. This competence indicates the need for 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.

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

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

1.2.i.4. Broadly-defined Engineering Problems are described in article 1.2.b.1

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

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

1.2.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.

1.2.j.3. The Program develops students to have the knowledge and attitude profile written in 1.2.h.1 in supporting the development of this learning outcome (1.2.j).

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

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

1.2.k.1. The Program develops students to have the knowledge and attitude profile written in 1.2.d.1 in supporting the development of this learning outcome (1.2.k)

1.2.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.

1.2.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.

**1.3. The Program shall publish the PPM and CPL to the public and shall establish policies and procedures for periodic review and follow up on them consistently.**

1.3.1. The Program effectively disseminates PPM and CPL to prospective students, students, faculty, and the general public.

1.3.2. The Program implements policies and procedures for reviewing PPM and CPL, including review inputs, time intervals, and stakeholder involvement.

1.3.3. The Program records and maintain the input, process, output and follow-up actions of the review in a documented system.

# 2. Learning Implementation

## 2.1. Curriculum

**The Program shall ensure that the academic curriculum is designed to cover the areas of study as mentioned in 2.1.1 points (a)-(d) and the learning process is implemented consistently to lead students to achieve CPL. The curriculum is adequately communicated to faculty members and students. The curriculum design and evidence of its implementation are recorded and maintained in a documented system**

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**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**

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

- Mathematics: The Program shall 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 shall be appropriate to the discipline and shall include laboratory experiences.

- At least 65% of the total credits are devoted to sub-discipline specific contents and information and communication technology. The sub-discipline specific content of the curriculum shall focus on the applied aspects of science and engineering and shall:
  (1) include a technical core preparing students for the increasingly complex technical specialties later in the curriculum,
  (2) develop student competence in the sub-discipline,
  (3) utilize and develop communication and information 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 shall include topics related to professional and ethical responsibilities, diversity and inclusion awareness, quality management, communication, as well as continuous improvement.
- The Integration of content: the curriculum shall 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 shall indicate the structural relationship, contribution and roadmap of each course in building the achievement of CPL during study period. Planning of learning process, course content, organization, learning methods and delivery, as well as assessment methods and criteria shall be established.**

2.1.2.1. The curriculum document shall describe the structural relationship showing alignment, roadmap, and contribution of each course in building the achievement of CPL during study period, planning of learning process, the depth and breadth of course content and learning outcomes (CPMK), organization, learning methods and delivery, as well as assessment methods and criteria.

2.1.2.2. The Program shall ensure that the content depth and breadth and specific requirements in each area of curricular study outlined in the Discipline Criteria have been met.

2.1.2.3. The curriculum shall provide students with engineering-technology practical experience and hands-on experience in real work environments.

2.1.2.4. The curriculum shall provide students with experience to integrate the knowledge, skills, and attitudes acquired during previous learning processes in a major design project as culmination of the curriculum (capstone project) to provide solutions to broadly-defined engineering problems. This project should have a significant credit load and function as a means of demonstrating the fulfillment of many CPL.

**2.1.3. The implementation of the learning process, assessment of course learning outcomes (CPMK) achievement, evaluation and follow-up to improve the quality of learning shall be recorded and maintained in a documented system to ensure consistent and controlled implementation of the curriculum.**

2.1.3.1. The Program is required to implement educational activities for students to achieve CPL. Educational activities include learning process, assessment of course learning outcomes (CPMK) achievement, evaluation and follow-up to improve the quality of learning.

2.1.3.2. Assessment is a systematic process of observing learning and rating of student performance against the learning expectations. Assessment of learning outcomes is the process of appraising knowledge, know-how, skills, and/or competencies of an individual against predefined criteria (learning expectations).

2.1.3.3. Evidence may take the forms of Semester Study Plan (RPS) and its realization, course portfolio, assessment instruments, artefacts of student works, evaluation meeting minutes, and other relevant documents of follow-up actions.

**2.1.4. The Program shall communicate the curriculum to faculty and students and shall establish policies and procedures of periodic review and implementing it consistently**

2.1.4.1. The Program shall communicate the curriculum effectively to faculty members and students.

2.1.4.2. The Program implements policies and procedure of periodical curriculum review, which covers review input, process, and output, including stakeholder involvement.

2.1.4.3. The input, process and output of curriculum reviews, as well as its follow-up action is recorded and maintained in a documented system.

## 2.2. Faculty

**The Program shall be supported by an adequate number, qualifications and competencies of faculty to carry out academic activities. The Program shall ensure faculty members' role and contribution, facilitate communication among faculty members, and utilize faculty member's academic experience and competence to support achievement of CPL.**

**2.2.1. The Program shall provide adequate number, qualifications, and competencies of faculty to serve academic and supporting activities.**

2.2.1.1. The Program shall describe qualifications of the faculty and their adequacy to cover all curricular areas and to meet the 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 ensure that its faculty members have opportunities to develop their professional competencies through activities such as sabbaticals leave, trainings, workshops, seminars, industrial internship, community services, etc.

**2.2.2. The Program ensures that the faculty play a role and contribute to the achievement of CPL through planning, implementation, course evaluation and improvement, as well as student guidance and other forms of contribution.**

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 evaluate the performance of faculty educational activities.

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**2.2.3. The Program shall facilitate good communication among faculty members to develop close cooperation in organizing academic activities to improve CPL achievement**

2.2.3.1. 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.

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**2.2.4. The Program encourages the use of faculty's knowledge and experience in research activities, community service, and other competency development to improve teaching and learning quality.**

2.2.4.1 The Program should provide evidence with respect to the contribution of faculty's updated knowledge, experience, and competency development are used to enhance student learning, such as course material improvement, delivery method, illustration enrichment, case studies, etc.

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## 2.3. Students and Academic Atmosphere

**The Program shall establish a system for accepting students, monitoring study progress, and creating a conducive academic atmosphere.**

**2.3.1. The Program shall have student admission policy and procedure, which include establishing requirements and processes for selecting new students, transfer students, credit transfer, and implementing the policy and procedure consistently.**

2.3.1.1. The Program shall have written policies on student admission, covering the requirements and the process for accepting new students, including information on how the Program ensures and documents that the applicants are meeting the prerequisites and how it handles cases where the 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. The Program shall establish and implement a system for monitoring study progress and evaluating student performance and maintain records of the process and results.**

2.3.2.1. The Program shall establish policies and procedures to monitor and evaluate the progress and performance of its students, including to handle non-performing students and to terminate students who are not able to complete their study.

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

**2.3.3. The Program shall build and maintain an academic atmosphere that is conducive to successful learning.**

2.3.3.1. The Program shall develop supporting activities to create and maintain a good academic atmosphere for learning, such as by providing student guidance and counseling on academic as well as non-academic aspects, encouraging co-curricular activities to build character and soft skills through guest lectures, studium generale, student involvement in faculty's research, and participation in competitive activities and scientific forums.

2.3.3.2. The Program shall describe the process of advising and providing career guidance to graduating students.

**2.3.4. The Program shall seek to foster students' entrepreneurial spirit to shape and strengthen their life skills.**

2.3.4.1. An entrepreneurial spirit shall be emphasized in the learning process. An entrepreneurial spirit is characterized by, among other things, a strong sense of purpose, perseverance, reasoning power, open-mindedness, professionalism, and a passion for learning.

## 2.4. Facilities

**The Program shall ensure the availability, maintenance, currency, and security of facilities and infrastructure, as well as nurture work health and safety culture to support an effective learning process.**

**2.4.1. The Program shall ensure the provision of infrastructure and physical facilities used in the learning process and supporting activities to create a conducive academic atmosphere.**

2.4.1.1. The Program shall describe the facilities in terms of their ability to support the attainment of the CPL and to provide an atmosphere conducive to learning, for example: offices and their supporting equipment (administration and secretariat, lecturers and assistants), classrooms and their supporting equipment, laboratories and workshops, computing facilities, IT support services, field laboratories and teaching industry, libraries, sports facilities, and places of worship.

**2.4.2. The Program shall evaluate the provided facilities in terms of adequacy, up-to-datedness, and their accessibility by students to ensure effective learning towards fulfilling CPL.**

2.4.2.1. The evaluation shall enable the Program to identify the gap between the existing and the required facilities, and to plan the necessary effort to improve and maintain the effective support to student learning.

2.4.2.2. The evaluation shall cover the quantity, quality, up-to-datedness, and accessibility aspects of the facilities.

**2.4.3. The Program shall implement policies and procedure for maintaining and updating of facilities and infrastructure.**

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

**2.4.4. The Program shall ensure that facilities and infrastructure are safe for use and shall strive to create a safety culture and a healthy working environment.**

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

2.4.4.2. The Program should seek to nurture a safety culture by, for example, creating participatory values, attitudes, behaviors, and competencies for safe actions among the academic community.

## 2.5. Institutional Responsibility

**The Program Operating Institution (Institution) shall be committed to and responsible for ensuring that the Program's educational activities run effectively and are sustainable through a good governance system and the provision of adequate resources and funding.**

**2.5.1. The Institution shall build a governance system that ensures effective involvement of Program leaders in decision-making that impacts quality, sustainability, and fulfilment of these Accreditation Criteria.**

2.5.1.1. The Program shall describe the governance system showing the institutional leadership in decision-making processes to ensure the quality and continuity of the program.

**2.5.2. The Institution shall establish and implement budgeting policy and procedure for implementing Program activities and providing the necessary facilities and infrastructure.**

2.5.2.1. 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.

**2.5.3. The Institution shall support the provision of supporting staff and the development of their professional competencies.**

2.5.3.1. The Program shall describe the adequacy of the supporting staff (administrative, instructional, and technical) in terms of the quality and quantity provided to the Program.

2.5.3.2. The Program shall facilitate professional development activities for supporting staff to improve the quality of education services.

**2.5.4. The Institution shall facilitate the Program in developing networks and collaboration with various parties both domestically and abroad to support the quality of education, research, and community service.**

2.5.4.1. The Institution shall make efforts to develop partnership with external institutions such as government offices, industry, research centers, and community units to foster the *Tridharma* of higher education institutions (teaching-learning, research, and community engagement).

2.5.4.2. The Program shall strive to improve the student learning process through the engagement of academia, business, and/or the government in the development of local region through the use of local resources.

# 3. Assessment of the Learning Outcomes

**3.1. The Program shall ensure that CPL assessment processes are planned and carried out periodically using an appropriate method for each CPL. The method covers the establishment of performance indicators, assessment techniques, planned schedule, and acceptance criteria.**

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**3.1.1. The Program shall define the performance indicators and acceptance criteria for each CPL established by the Program as assessment reference and evidence of CPL achievement.**

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3.1.1.1. Performance indicators refer to the means by which an objective can be judged to have been achieved or not achieved. Indicators are used to observe progress and to measure actual results compared to expected results (acceptance criteria). Indicators are, therefore, tied to learning outcomes and serve as yardsticks, by which to measure its degree of achievement. Performance indicators are quantitative tools and are usually expressed as a rate, ratio, or percentage.

3.1.1.2. Assessment of CPL is one or more processes that identify, collect, and prepare data to evaluate the extent of CPL attainment at program-level.

**3.1.2. The Program shall establish appropriate assessment methods and planned schedule of assessment for each CPL.**

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3.1.2.1. Assessment methods are techniques or instruments to measure CPL attainment. Assessment shall at least apply relevant quantitative direct measures, and preferably strengthened by qualitative indirect measures as appropriate. Appropriate sampling approach may be used as part of Program assessment process.

3.1.2.2. The Program shall define periodic assessment schedule of CPL at an appropriate interval.

**3.1.3. The Program shall ensure that the CPL assessment process and results are recorded and maintained in a documented system.**

3.1.3.1. The process and results of CPL assessment are recorded and maintained in a documented system in such a way to enable meaningful data analysis.

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**3.2. The Program shall ensure that each graduate meets all determined CPLs and other graduation requirements.**

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**3.2.1. The Program shall implement policies and mechanisms to ensure each graduate achieves CPL and other graduation requirements.**

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

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**3.2.2. Fulfilment of graduation requirements is recorded and maintained in a documented system.**

3.2.2.1. The instrument, the process and results of graduation requirement review shall be documented. Records are maintained as evidence that all graduates have been evaluated and that all CPL have been fulfilled.

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# 4. Continual Quality Improvement

**4.1. The Program shall ensure that there is a periodic and continual quality improvement process, which is based on the results of measuring the achievement of CPL.**

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**4.1.1. The Program shall conduct periodic analysis and evaluation of CPL assessment, which includes identification of issues, fulfillment against established performance targets, and their root causes.**

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4.1.1.1. Continual quality improvement means the ongoing improvement of processes that lead to the achievement of higher levels of performance. To ensure this 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.

4.1.1.2. Evaluation is one or more processes for interpreting the data and evidence accumulated from assessment processes. Evaluation of the education system is an evaluation of overall achievement of the program performance as a basis for continual quality improvement.

**4.1.2. The Program shall utilize the results of the CPL achievement evaluation to make decisions to continually improve quality and performance.**

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4.1.2.1. The output of the evaluation shall contain recommendations on the improvement of overall Program performance, such as curriculum, learning materials, methods of delivery, learning and assessment methods, as well as suitability and adequacy of the learning outcomes with regards to the needs of stakeholders and resources.

**4.2. The Program shall ensure that the quality improvement decisions are implemented, and their effectiveness are evaluated. Evidence of the implementation of quality improvements and effectiveness is recorded and maintained in a documented system that enables relevant parties to have access.**

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**4.2.1. The Program shall implement the quality improvement decisions and evaluate their effectiveness as evidence of consistent implementation of PDCA cycle.**

4.2.1.1. Implementing and evaluating the effectiveness of continual improvement decisions are important indicators to show a completed PDCA cycle.

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**4.2.2. The Program shall maintain a documented system of the implementation of quality improvement decisions and ensure its accessibility.**

4.2.2.1. The documentation and records of evaluation process, results, and its follow-up decisions shall be maintained as evidence that the decisions have been conducted. These documentation and records shall be accessible to the relevant parties.

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# 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 shall 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 shall 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 shall 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 shall 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 shall be appropriate to support the program educational objectives.

The curriculum shall 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 shall 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 shall 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 shall include asset management, imaging modality fundamentals, clinical laboratory equipment fundamentals, risk analysis, and process improvement. The curriculum shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall support the program educational objectives. The curriculum shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 shall 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.