Accreditation Criteria for Engineering-Technician Programs

Developed according to the Graduate Attribute Exemplars of the Dublin Accord

Version 2024

Common Criteria & Critreria Guide

Discipline Criteria

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Document Control

The Accreditation Criteria for Engineering-Technnician 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 and Criteria Guide

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 technician 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 three-year engineering technician 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 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 wide practical procedures and practices.

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

(1) a descriptive and formula-based understanding of the natural sciences applicable in a sub-discipline, as well as awareness of directly relevant social sciences.

(2) procedural mathematics, numerical analysis, statistics applicable in a sub-discipline.

(3) a coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline.

(4) engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline.

1.2.b. An ability to identify and analyse well-defined engineering problems achieving demonstrable conclusions using codified methods of analysis specific to their field of activity.

1.2.b.1. Well-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 extensive practical engineering knowledge as reflected in

(i) knowledge that supports engineering design and operations based on the techniques and procedures of a practice area,

(ii) codified practical engineering knowledge in recognized practice area, supported by theoretical knowledge defined in a coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline, and engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline.

(2) *Range of conflicting requirements:* Involve several 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 in standardized ways.

(4) *Familiarity of issues*: are frequently encountered and thus familiar to most practitioners in the practice area.

(5) *Extent of applicable codes*: addresses problems that are encompassed by standards and/or documented codes of practice.

(6) *Extent of stakeholder involvement and conflicting requirements* involve a limited range of stakeholders with differing needs.

(7) *Interdependence*: address discrete components of engineering systems.

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 well-defined technical problems appropriate to the discipline with proper consideration for public health and safety, as well as cultural, societal, and environmental considerations.

1.2.c.1. The program shall develop knowledge that supports engineering design and operations based on the techniques and procedures of a practice area.

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

1.2.d. An ability to locate and search for relevant codes and catalogues, conduct standard tests and measurements in the investigation of well-defined problems.

1.2.d.1. The program shall engage students with the current technological literature of the practice area.

1.2.d.2. Well-defined Engineering Problems are described in article 1.2.b.1.

1.2.e. An ability to use and utilize all required resources, technologies, modern computing, engineering, and IT Tools and awereness with their limitations to solve well-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)

1.2.e.2. Codified practical engineering knowledge in recognized practice area

1.2.e.3 Well-defined Engineering Problems are described in article 1.2.b.1.

1.2.f. An ability to evaluate the impact of sustainable development when solving well-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).

1.2.f.2. Knowledge of issues and approaches in engineering technician practice, such as public safety and sustainable development.

1.2.f.3. Well-defined Engineering Problems are described in article 1.2.b.1

1.2.g. An ability to consistently adhere to professional ethics and technician practice norms including compliance with relevant 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 comprehend the work of others, document their own work, and give and receive clear instructions effectively and inclusively to a variety of well-defined activities with the engineering community and with society at large

1.2.i.1. This competence indicates the need for active and effective communication skills including being able to comprehend the work of others, document their own work, and give and receive clear instructions 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. Well-defined Engineering Problems are described in article 1.2.b.1

1.2.j. An ability to demonstrate awareness of engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments

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 updating in the face of specialized technical knowledge

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)-(c) 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) General education

2.1.1.1. The Program shall ensure that the curriculum meets the subject areas appropriate to engineering technician 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. The curricula will include the application of algebra and trigonometry at a level appropriate to the student outcomes and the discipline.
- Applied natural science: The applied natural sciences content of the curriculum must be appropriate to the discipline.

- At least 65% of the total credits is sub-discipline specific content. The sub-discipline specific content of the curriculum shall be engineering or engineering technology courses and must 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) 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
  (4) 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 content that complements the technical contents of the curriculum. 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 well-defined engineering problems and design systems, components or processes integrating core areas.

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 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.

2.1.2.4. 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 well-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.

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.

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.

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.

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.

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.

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.

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

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.

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.

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.

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.

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.

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.

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.

Discipline Criteria

Discipline Criteria for Aeronautical Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Kedirgantaraan – Persatual Insinyur Indonesia* (PII College for Aeronautics Engineering)

Version: 2024

These program criteria apply to engineering technician programs that include aeronautical or similar modifiers in their titles. Many aeronautical/aerospace engineering technicians involve the translation of engineering ideas and concepts into functioning vehicles, engines, avionics, mission systems, payloads and components. It is anticipated that fundamental experiential skills may incorporate portions of the approved FAA Airframe and Powerplant or equivalent curriculum.

Curriculum

The curriculum must provide technician degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in aeronautical engineering technician. Graduates of technician degree programs typically have strengths in specifying, installing, fabricating, testing, documenting, operating, selling, or maintaining basic support and manufacturing practices for aeronautical/aerospace vehicle, ground support systems and component support. The curriculum must contain the following curricular areas:

a. a minimum of three subject areas chosen from: engineering materials, applied structures, applied mechanics, applied aerodynamics, applied propulsion, and fundamentals of electricity.
b. assembly and support processes, industry standards, regulations and documentation, and computer-aided engineering graphics with added technical depth in at least one of these areas; and
c. applied physics having an emphasis in applied mechanics and other technical topics in physics appropriate to the program objectives.

Faculty

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

Discipline Criteria for Air Conditioning, Referigerating, Heating, and Ventilating Engineering Technician and Similarly-named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Mesin Persatual Insinyur Indonesia* (PII College for Mechanical Engineering)

Version: 2024

These program criteria apply to engineering technician programs that include air conditioning, HVAC, refrigerating, heating, or ventilating, or similar modifiers in their titles. The programs prepare graduates with the technical and managerial skills necessary to enter careers in the design, application installation, manufacturing, operation, marketing and maintenance of heating, ventilating, air-conditioning, and refrigeration (HVAC&R) systems.

Curriculum

The curriculum must provide technician degree graduates with instruction in the knowledge, techniques, skills, and ability to use modern equipment in air conditioning, refrigerating, heating, and ventilating engineering technician. The curriculum must include instruction in the following topics:

a. basic HVAC&R principles, including heat transfer, fluid mechanics, combustion, air conditioning and refrigeration processes, heating and cooling load calculations, electrical circuits, and controls.
b. application of HVAC&R principles for well-defined technical activities, including sizing of pipe and duct, analysis of ladder logic diagrams, evaluation of equipment performance, and use of computerized tools for energy calculations and equipment selection; and
c. application of HVAC&R principles for system operations, including troubleshooting, servicing, and maintenance tasks.

Faculty

Most faculty teaching courses that are primarily designed in content must be qualified to teach the subject matter by professional licensure or by education and design experience.

Discipline Criteria for Automotive Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Mesin Persatual Insinyur Indonesia* – (PII College for Mechanical Engineering)

Version: 2024

These program criteria apply to engineering technician programs that include automotive or similar modifiers in their titles. The term "automotive" refers to land, sea, air, or space mobility. An accreditable program will prepare graduates with technical and managerial skills necessary to enter careers in design, manufacturing, marketing, operation, and maintenance in the field of automotive engineering technician.
Level and scope of career preparation will depend on the degree level and specific program orientation as portrayed by its educational objectives.

Curriculum

The curriculum must provide technician degree graduates with instruction in the knowledge of operations, maintenance, manufacturing, and use of modern equipment in automotive engineering technician. Graduates typically enter the profession as engineering technicians or are prepared for transfer to a baccalaureate degree program, as appropriate to the program's educational objectives. The following curricular areas are required:

a. application of computer technologies commonly used in industry, governmental service, and private practice associated with land, sea, air, or space mobility.
b. application of probability and statistics to the solution of problems related to land, sea, air, or space mobility; and
c. working knowledge of the design, manufacture, and maintenance of major subsystems and technologies associated with land, sea, air, or space mobility.

Faculty

Study program must have responsibility and sufficient authority to define, revise, implement, and achieve program objectives. The program must demonstrate that study programs teaching upper-division courses understand current professional practice in the automotive industry.

Discipline Criteria for Architectural Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Arsitektur Persatuan Insinyur Indonesia* – (PII College for Architectural Engineering)

Version: 2024

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

Curriculum

Graduates of technician degree programs typically enter careers in the construction, testing, operation, and maintenance of building systems; they may also produce and utilize basic construction documents and perform basic analysis and design of system components. The curriculum must provide instruction in the following curricular areas:

a. employment of architectural theory and design in a design environment.
b. utilization of instruments, methods, software, and techniques that are appropriate to produce A/E documents and presentations.
c. utilization of measuring methods that are appropriate for field, office, or laboratory; and
d. application of fundamental computational methods and elementary analytical techniques in sub-disciplines related to architectural engineering.

Faculty

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

Discipline Criteria for Chemical, Biochemical, Biomolecular Engineering Technician and Similarly-named Programs

Lead Society(ies):

- *Badan Kejuruan Kimia Persatuan Insinyur Indonesia* (PII College for Chemical Engineering)

Version: 2024

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

Curriculum

The curriculum must provide technician degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in chemical engineering technician. Graduates typically enter the profession as process, maintenance or laboratory/quality control technicians. Graduates of technician programs have strengths in the safe operation, maintenance and sampling/analysis of chemical processes. 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, heat transfer, reactions, and separations) to the operation of chemical processes and appropriate to program educational objectives.
c. application of instrumentation and process control, quality control, and computer applications to the operation of chemical processes; and
d. chemistry with laboratory experience and coursework topics in both inorganic and organic chemistry.

Discipline Criteria for Civil Engineering Technician and Similarly-named Programs

Lead Society(ies):

Badan Kejuruan Sipil Persatuan Insinyur Indonesia (PII Chapter for Civil Engineering)

Version: 2024

These program criteria apply to Engineering Technician programs that include civil or similar modifiers in their titles. Graduates of civil Engineering Technician programs will have the technical skills necessary to enter careers in construction testing, operation, and maintenance of buildings and infrastructure and may produce and utilize basic construction documents and perform basic analysis and design of system components.

Curriculum

Graduates of Engineering Technician degree programs typically testing, operation and maintenance specify construction testing, operation, and maintenance of buildings and infrastructure 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.

Faculty

Faculty members teaching courses on testing, operation and maintenance should have either certification of professional engineer or qualification through experience in Engineering Technician design and practices.

Discipline Criteria for Computer Engineering Technician and Similarly Named Programs

Lead Society(ies):

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

Version: 2024

These program criteria apply to Engineering Technician programs that include computer 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 in computer Engineering Technician. Graduates of technician degree programs have strengths in the building, testing, operation, and maintenance of computer systems and their associated software systems. The curriculum must include instruction in the following topics:

a. application of electric circuits, computer programming, associated software applications, analog and digital electronics, microcontrollers, operating systems, local area networks, and engineering standards to the building, testing, operation, and maintenance of computer systems and associated software systems; and
b. application of natural sciences and mathematics at or above the level of algebra and trigonometry to the building, testing, operation, and maintenance of computer systems and associated software systems.

Faculty

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

Discipline Criteria for Construction Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Sipil Persatuan Insinyur Indonesia* – (PII College for Civil Engineering)

Version: 2024

These program criteria apply to Engineering Technician programs that include construction or similar modifiers in their titles. Graduates of construction Engineering Technician 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 Engineering Technician degree programs typically specify in the construction, testing, operation, and maintenance of buildings and infrastructure; they may also utilize basic construction documents to participate in 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.

Faculty

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

Discipline Criteria for Electrical/Electronics(s) Engineering Technician and Similarly Named Programs

Lead Society(ies):

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

Version: 2024

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

Curriculum

The curriculum must provide Engineering Technician degree graduates with instruction in the knowledge, techniques, skills and use of modern tools necessary to enter careers in application, installation, manufacturing, operation and/or maintenance of electrical/electronic(s) systems. Graduates of Engineering Technician degree programs are well prepared for implementation of electrical/electronic(s) systems. Graduates of associate degree programs have strengths in the building, testing, operation, and maintenance of electrical systems.

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 algebra and trigonometry to the building, testing, operation, and maintenance of electrical/electronic systems.

Faculty

Program faculty members must understand professional practice and maintain electrical/electronic in their respective professional areas.

Discipline Criteria for Environmental Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Lingkungan Persatuan Insinyur Indonesia* (BKTI PII) – PII College for Environmental Engineering

Version: 2024

These program criteria apply to Engineering Technician programs that include environmental or similar modifiers in their titles. An accreditable program in environmental Engineering Technician will prepare graduates with the technical and managerial skills necessary to enter careers in design, operation, and maintenance in the field of environmental Engineering Technician.

Curriculum

The curriculum must provide technician degree graduate with instruction in the knowledge, techniques, skills, and use of modern equipment in environmental engineering technician. Graduates of technician degree programs have strengths in operation and maintenance of facilities for monitoring or treatment of wastes and environmental contamination or conducting assessment of environmental contamination, including environmental sampling and laboratory analysis. The following curriculum topics are required:

a. Field and laboratory measurements of environmental parameters, including use of common instruments and equipment appropriate to environmental engineering technician.
b. Preparation of documents such as permit applications or reports to describe results of environmental sampling and measurement.
c. Quality control methods in sampling and measurement and utilizing basic statistical techniques in analysis of the results.
d. Concepts of professional practice and application of project management.
e. Roles and responsibilities of public and private organizations pertaining to environmental regulations, including applicable standards, reporting requirements and other permitting requirements; and
f. Operating principles of commonly used unit processes for environmental protection.

Faculty

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

Discipline Criteria for Geomatics/Surveying Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Geodesi Persatuan Insinyur Indonesia* – PII College for Geodetic Engineering

Version: 2024

These program criteria apply to surveying Engineering Technician, geomatics Engineering Technician or similarly named programs.

Curriculum

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

a. Mathematical concepts to execute basic surveying/geomatics analysis.
b. Basic historical elements of land ownership legal processes where surveying/geomatics are an integral part.
c. Data science analysis for conformance of precision/accuracy and blunders/error detection.
d. Use of modern measurement equipment in field laboratories to construct or locate features above, below or on the Earth's surface.
e. Basic communications that include oral, graphical and electronic forms.
f. Additional material from a minimum of three subject areas chosen from:
    - boundary surveying
    - property law
    - route surveying
    - construction surveying
    - mapping
    - geodesy
    - drainage and elementary roadway design

Faculty

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

Discipline Criteria for Graphics/Design/Drafting Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Mesin Persatuan Insinyur Indonesia* – PII College for Mechanical Engineers

Version: 2024

These program criteria apply to Engineering Technician programs that include engineering graphics, design or drafting or similar modifiers in their titles and have an emphasis on mechanical components and systems. An accreditable program in engineering graphics or design or drafting Engineering Technician will prepare graduates with knowledge, hands-on skills, and problem-solving ability to enter careers related to preparation of engineering drawings and basic design of mechanical components and systems. The 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 technician degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in engineering graphics/design/drafting engineering technician. Graduates typically enter the profession as engineering technicians or are prepared for transfer to a baccalaureate degree program, as appropriate to the program educational objectives. Graduates must have instruction in engineering graphics/drafting, basic mechanical design and development, specifications related to mechanical components and systems and manufacturability of components. The following curriculum topics are required:

a. use of 3D parametric computer-aided drafting and design software used for a variety of mechanical drawing techniques (such as orthographic, section, auxiliary, assembly models, detailed working drawings and rendered images).
b. apply principles of
    1. geometric dimensioning and tolerancing.
    2. fundamentals of engineering materials, applied mechanics.
    3. manufacturing methods.
c. use of basic knowledge and familiarity with industry codes, specifications, and standards (ASME, ANSI or others); and
d. an integrating or capstone experience utilizing skills acquired in the program.

Discipline Criteria for Industrial Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Industri Persatuan Insinyur Indonesia* – PII College for Industrial Engineering

Version: 2024

These program criteria apply to Engineering Technician programs that include industrial or similar modifiers in their titles.

Industrial Engineering Technician is concerned with the design, installation, maintenance and improvement of integrated processes and the resulting products or services within an organization. It draws upon specialized knowledge and skill in the mathematical, natural, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results to be obtained from such systems.

Curriculum

The curriculum must provide technician degree graduates with instruction in the knowledge, techniques, skills, and use of modern tools and equipment skills necessary to enter careers in industrial engineering technician in organizations within manufacturing, service, healthcare, transportation, or other operating environments or to continue their education at the baccalaureate level. The curriculum must include the following topics:

a. Probability and statistics.
b. Creating and reviewing engineering drawings.
c. Workplace design and measurement.
d. Quality and process control.

Faculty

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

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

Lead Society(ies):

- *Badan Kejuruan Teknik Informatika Persatuan Insinyur Indonesia* – PII College for Informatics Engineering

Version: 2024

These program criteria apply to Engineering Technician programs that include information, information security, cybersecurity, information assurance 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 application, installation, operation and/or maintenance of computer systems, networks, and telecommunications systems dedicated to the processing and transfer of information. Graduates of technician degree programs in Information Engineering Technician have strengths in the building, testing, operation, and maintenance of hardware and software systems. Graduates of technician degree programs that contain the modifier "information security," "cybersecurity," or "information assurance" in the title will also have strengths in computer and network security.

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; and
c. Application of legal, ethical and security issues involving data and information

The curriculum for programs containing the modifier "information security," "cybersecurity" or "information assurance" in the title must also include instruction in:

d. application of cybersecurity principles, techniques and tools to protect devices and systems that incorporate interconnected hardware and software, and human aspects of a system.

Faculty

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

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

Lead Society(ies):

- *Badan Kejuruan Teknik Fisika Persatuan Insinyur Indonesia* – PII College for Engineering Physics
- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* – PII College for Electrical Engineering

Version: 2024

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

Curriculum

The curriculum must provide Engineering Technician degree graduates with instruction in the technical and managerial skills necessary to enter careers in design, manufacturing, operations, and maintenance in the fields of measurement, control, robotics, and automation Engineering Technician. Engineering Technician have strengths in their knowledge of operations, maintenance, and Manufacturing.

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.

Faculty

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

Discipline Criteria for Manufacturing Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Mesin Persatuan Insinyur Indonesia* – PII College for Mechanical Engineering

Version: 2024

These program criteria apply to Engineering Technician programs that include manufacturing or similar modifiers in their titles. An accreditable degree program in manufacturing Engineering Technician 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 technician degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in manufacturing Engineering Technician. Graduates typically enter the professions in manufacturing operations and service functions or are prepared for transfer to a baccalaureate degree program, as appropriate to 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; and
d. statistics, quality and continuous improvement, and industrial organization and management.

Faculty

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

Discipline Criteria for Marine, Maritime, Ocean Structure Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Teknik Kelautan Persatuan Insinyur Indonesia* – PII College for Ocean Engineering

Version: 2024

These Discipline Criteria apply to all Engineering Technician programs that include marine, maritime, ocean structure or similar modifiers in their titles.

Curriculum

The curriculum must provide Engineering Technician degree graduates with instruction in the knowledge, techniques, skills, and use of modern equipment in Marine, Maritime, and Ocean Structure Engineering Technician. The curriculum must contain the following topics:

a. application of the principles of college-level physics and chemistry to problems associated with Marine, Maritime, and Ocean Structure Engineering Technician applications;
b. the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, statics, dynamics, and thermodynamics and their application to Marine, Maritime, and Ocean Structure equipment, systems and/or vehicles;
c. the use and application of modern instrumentation for measuring physical phenomena related to Marine, Maritime and Ocean Structure Engineering Technician, including the design of experiments, data collection, analysis, and formal report writing; and
d. the operation, maintenance, analysis, design and management of ship powering and propulsion or/and modern marine power plants and associated marine auxiliary equipment and systems, including the use of design manuals, material/equipment specifications, and industry regulations applicable to Marine, Maritime, and Ocean Structure Engineering Technician.

Discipline Criteria for Mechanical Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Mesin Persatuan Insinyur Indonesia* – PII College for Mechanical Engineering

Version: 2024

These program criteria apply to Engineering Technician programs that include mechanical or similar modifiers in their titles. An accreditable program in mechanical Engineering Technician prepares graduates with knowledge, problem-solving ability and hands-on skills to enter careers in the design, installation, manufacturing, testing, technical sales, maintenance, and other endeavors typically associated with mechanical components and systems. Programs emphasize how things work, how they are made, and the realization that most mechanical components and assemblies become parts of complex systems, an important consideration realized at the beginning of the design process. The level and scope of career preparation will depend on the degree level and specific program orientation.

Curriculum

The curriculum must prepare technician degree graduates with the knowledge, techniques, skills, and use of modern equipment in mechanical Engineering Technician. Graduates must have strengths in specifying, installing, building, testing, documenting, operating, selling or maintaining basic mechanical systems. Programs prepare graduates for entry into industry as engineering technicians or for transfer to a baccalaureate degree program as appropriate to support the program's educational objectives. The following curricular topics are required (unless the program's faculty and primary constituents approve the substitution of other specific, mechanically related technical subjects supporting attainment of program educational objectives):

a. Application of principles of geometric dimensioning and tolerancing;
b. Use of computer aided drafting and design software;
c. Selection, set-up, and calibration of measurement tools/instrumentation;
d. Preparation of laboratory reports and systems documentation associated with development, installation, or maintenance of mechanical components and systems;
e. Basic familiarity and use of industry codes, specifications, and standards;
f. Use of basic engineering mechanics; and
g. An integrating or capstone experience utilizing skills acquired in the program.

Faculty

The program must demonstrate that faculty members are maintaining currency in their specialty areas.

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

Lead Society(ies):

- *Badan Kejuruan Teknik Mesin Persatuan Insinyur Indonesia* – PII College for Mechanical Engineering
- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* – PII College for Electrical Engineering

Version: 2024

These program criteria apply to Engineering Technician 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 technician degree graduates with the 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 technician degree programs typically have strengths in applying their knowledge to the occupational areas of: 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 Technician, and the unique objectives of individual programs, some technician degree 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 technician degree graduates must be appropriate to support the educational objectives of the program. The following curricular areas are required:

a. Mechatronics component and system application; tooling and assembly (with respect to electrical components and circuits (digital and analog); embedded systems and control; pneumatic, hydraulic, industrial controls; automation and PLCs);
b. Mechatronics systems software analysis tools; connectivity, industrial communication protocols and information security;
c. Quality and continuous improvement techniques;
d. Selection, set-up, and calibration of measurement tools, instrumentation and sensors;
e. Preparation of laboratory reports and systems integration, drawings associated with development, installation, or maintenance of mechatronics components and systems;
f. Troubleshooting of mechatronics system including maintenance or repair; and
g. An integrating experience or capstone project that illustrates student competencies in applying both technical and non-technical skills in successfully solving industrial mechatronics problems.

Discipline Criteria for Software Engineering Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Informatika Persatuan Insinyur Indonesia* – PII College for Informatics Engineering

Version: 2024

These program criteria apply to Engineering Technician 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 Technician 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 Technician and Similarly Named Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Elektro Persatuan Insinyur Indonesia* – PII College for Electrical Engineering

Version: 2024

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 the application, installation, management, operation, and/or maintenance of telecommunications systems. Graduates of associate degree programs have strengths in the building, testing, operation, and maintenance of telecommunication systems.

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.

Faculty

Program faculty members must understand professional practice and maintain electrical/electronic in their respective professional areas.