Accreditation Criteria for Engineering Programs

Developed according to the Graduate Attribute Exemplars of the Washington Accord

Version 2023a

Common Criteria & Criteria Guide

Discipline Criteria

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

Document Control

The International Common Criteria and Criteria Guide version 2023 for Engineering Programs have been approved by IABEE Executive Committee on 18 February 2023. The 2023 version has been reorganized in November 2024 and released as version 2023a. Redundant sections have been reduced and its writing has been refined to enhance clarity regarding the fulfillment of the criteria. This version has been approved by the Executive Committee to be used from evaluation cycle 2025-2026.

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 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 bachelor programs or other higher education programs which IABEE considers as 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 must be able to make a clear distinction among the streams with regards to permanent records of the graduates, such as certificate and academic transcript.

0.8. 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 the 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 the 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 (j), 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.j

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. Ability to apply knowledge of mathematics, natural sciences and/or material sciences, information technology, and engineering to build a holistic understanding of engineering principles.

1.2.a.1. Engineering principles refers to ideas, rules and concepts to be considered when solving an engineering problem. The set of principles may vary among engineering disciplines depending on the uniqueness of systems, problems, ethical issues, and problem-solving methods of the discipline.

1.2.a.2. Attainment of comprehensive understanding of engineering principles is indicated by mastery of mathematics, basic/natural sciences, and information technology relevant to the discipline of the Program, and the ability to utilize the aforementioned knowledge.

1.2.b. Ability to design components, systems and/or processes to meet specific needs, within realistic constraints such as legal, economic, environmental, socio-political, health and safety, sustainability and resource aspects.

1.2.b.1. The ability to design components, systems, and/or processes is the hallmark competence of engineering education. Design implies the ability to utilize multidimensional thinking with knowledge of global perspective to develop components, systems, and/or processes to achieve specific objectives. It is not limited to drawing a plan, but also refers to the synthesis of various academic disciplines and technologies to pursue practicable solutions to a problem that does not necessarily have one correct answer (complex problem).

1.2.b.2. Design also involves a process of optimization which considers multiple realistic constraints, such as law, economic, environment, social, politics, health and safety, and sustainability as well as utilization of the knowledge of culture, society, and available resources.

1.2.c. design and carry out laboratory and/or field experiments, as well as analyze and interpret data to produce valid engineering decisions.

1.2.c.1. This competence refers to application of scientific methodologies in the design and application of laboratory and/or field experiments within the broad context of engineering practice such as problem identification, testing of potential solution ideas, solution implementation plan, and other design-related activities.

1.2.c.2. Experiments may include activities in physical laboratories, computer simulations, and field experiments

1.2.d. Ability to identify, formulate, analyze, and solve complex engineering problems

1.2.d.1. Complex engineering problem solving involves iterative activities incorporating the formulation of the problem, establishment of requirements, development of solution alternatives, selection of best alternative, application of solution, evaluation, and validation of solution against multiple problem constraints, and revision of solution.

1.2.d.2. This competence includes the ability to:

- acquire updated and relevant information and knowledge from research literature.
- utilize techniques and methods for performing engineering works comprising survey, data analysis, planning, design, operation and maintenance.
- apply the engineering logical thinking for handling both of the design and troubleshooting context.
- utilize creative/innovative thinking and knowledge creation/co-creation skills.

1.2.e. Ability to apply current engineering methods, skills and tools necessary for engineering practice, including understanding their limitations

1.2.e.1. The Program shall have a clear definition of the methods, skills, and modern engineering tools appropriate for its level of study and engineering discipline, and how these are learnt throughout the curriculum. This definition include:

- ability to select a method and tools with their strength and limitation characteristics for a given problem
- ability to utilize and adjust the method and tools to suit specific problems
- specific use of prediction and modelling tools in complex problem solving

1.2.f. Ability to communicate effectively with the engineering community and the general public, both verbally and in writing

1.2.f.1. This competence indicates the need of active and effective communication skills; socio-cultural perspective shall be considered for the acceptability and workability of the implementation of engineering works. These oral and written communications shall encompass complex engineering activities.

1.2.f.3. A measurable portion of the oral and/or written communications involve the use of internationally recognized languages.

1.2.g. Ability to understand and apply the principles of engineering management and decision making based on economic principles

1.2.g.1. This competence refers to the ability to plan, accomplish, and evaluate tasks associated with any curricular activity deemed appropriate by Program for its assessment and evaluation. The assessment focuses more on task management skills rather than the substantial outcome of the task itself.

1.2.g.2. This competence also includes understanding and applying engineering management principles and economic decision-making, as a member and leader in a project team.

1.2.h. Ability to work as a leader or member in multidisciplinary and multicultural teams

1.2.h.1. This competence refers to the ability to work collaboratively with people from different technical disciplines, fields, and cultural backgrounds.

1.2.h.2. Multicultural concerns such as tolerance, mutual understanding, appreciation on differences in building a synergy, are important considerations for the success of a teamwork. Multidiscipline circumstances may cover disciplines within engineering and non-engineering disciplines.

1.2.i. Ability to be accountable and responsible to the community and adhere to professional ethics in solving engineering problems

1.2.i.1. This competence refers to the understanding on the following issues and the ability to elaborate, discuss, present argument, and/or respond accordingly:

- the understanding and appreciation of cultural issues
- the impact of technology of related engineering fields on public welfare, environmental safety, and sustainable development
- the legal aspects and engineering ethics
- the engineering history and standard & code philosophy in design.

1.2.j. Ability to understand the need for, prepare for, and participate in lifelong learning, including access to knowledge about relevant contemporary issues

1.2.j.1. The Program is required to assist students to become accustomed to independent and continuous learning through lectures, research, experiments, practical training, exercises, assignment, and other alternative sources.

1.2.j.2. This competence refers tounderstanding the necessity of continuous professional development, an ability to acquire updated information and knowledge, and an awareness of the importance of sharing knowledge.

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 periodic reviewing PPM and CPL with stakeholder involvement, which covers reviewing inputs and time intervals.

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)-(e) 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

---

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

a) Mathematics and discipline-specific natural sciences
b) Discipline-specific engineering science and technology
c) Information and communication technology
d) Engineering design and problem-based experiments
e) General education, which includes morality, ethics, socio-culture, environment, and management

---

2.1.1.1. The Program shall ensure that the curriculum meets the subject areas appropriate to engineering 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)):

- A minimum of 20% of a combination of college level mathematics and basic sciences appropriate to the discipline. Basic science include at least a course with experimental experience.
- A minimum of 40% of engineering topics, consisting of engineering sciences, and engineering design appropriate to the student's field of study.
- A maximum of 30% general education components that complement the technical content of the curriculum and are consistent with the Learning Outcomes.

2.1.1.2. Mathematics area shall be that of a college level that requires a degree of mathematical sophistication or an appropriate mathematical formalism. Mathematics area does not include courses of computer/information technology.

2.1.1.3. Basic/natural sciences are defined as disciplines that focus on understanding of the fundamental aspects of natural phenomena, including biology (life sciences), physics, chemistry, earth, space, and material sciences.

2.1.1.4. A course within the subject area of mathematics & basic sciences shall be without combined contents with the other subject areas, such as with engineering science or engineering design areas.

2.1.1.5. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practices on the other.

2.1.1.4. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process, in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet the stated needs.

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 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 complex 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 learning quality.

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 follow-up documents.

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 with stakeholder involvement, which covers reviewing input, process, and output.

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 relevant Discipline 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 to meet the curriculum of the program.

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. A system for monitoring student progress and evaluating performance includes student academic advising to support student success. The system shall provide reliable records on student performance to facilitate effective advising and function as early warning for the program to take the necessary efforts in ensuring CPL fulfillment by the students.

2.3.2.2. The Program shall provide the students with advice and counseling services on both academic and non-academic aspects, as well as career guidance. The Program shall describe the process of advising and providing career guidance to students, how often students are advised, and who provides the advising.

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 learning atmosphere, such as by 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.

2.3.4. 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 fostered 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-dateness, 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-dateness, 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 of the program and its adequacy to ensure the quality and continuity of the program and how the leadership is involved in decisions that affect the Program.

2.5.2. 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 of the established CPL 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.

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 Agricultural and/or Bio-Systems Engineering in Bachelor Programs

Lead Society(ies):
○ *Perhimpunan Teknik Pertanian Indonesia* (PERTETA) – Indonesian Association for Agricultural Engineering
○ *Badan Kejuruan Teknik Pertanian Persatuan Insinyur Indonesia* (BKTP PII) – PII Chapter for Agricultural Engineers

Version: 2016

These Discipline Criteria apply to bachelor programs that include “agricultural engineering”, “bio-system engineering,” “bio-production engineering”, and similar modifiers in their titles.

Curriculum

The curriculum shall provide fundamental knowledge of engineering principles, agriculture and/or biosystem related sciences and ability to apply them to analyze, interpret, identify alternative solutions, and implement experiments for enhancing the performance agricultural systems or solution of common problems in agriculture and/or biosystem.

The learning and educational process articulating in the curriculum must be conducted in such a way to ensure that the graduates have sufficient knowledge, skill and attitude in the process to identify, analyze, formulate, design, use and control of machinery, structure and systems to solve engineering problems as required in the production of plant and animal, processing and handling the agricultural and/or biological materials.

The curriculum content that be considered as “educational components of mathematics, natural sciences and technologies” appropriate to the field shall include systematic subject clusters related with mathematics and natural sciences (focusing on multiple subjects such as, physics, chemistry, biology, or geography), and area of agricultural meteorology, irrigation, drainage and reclamation engineering (agricultural civil and environmental engineering), and/or area of agricultural machinery & automation, and/or area of agricultural work system and safety, and/or area of agricultural/biological production system, and/or area of agriculture/biological and environment information.

To conduct the learning and educational process the program shall be considered as “to provide a sufficient number of faculty members able to realize the curriculum with applicable educational methods and to improve the educational result of the program, and shall provide the faculty with institutional support.”

Discipline Criteria for Agro-Industrial and Similarly-named Engineering Programs

Lead Society(ies):
○ *Badan Kejuruan Industri Pertanian Persatuan Insinyur Indonesia* (BKIP PII) – PII Chapter for Agro-Industrial Engineers
○ *Forum Komunikasi Program Studi Industri Pertanian Indonesia* (FKPSIP)

Version: 2016

These Discipline Criteria apply to engineering programs that include "agro-industrial" and similar modifiers in their titles

Curriculum

The curriculum prepares graduates with ability to design, develop, implement, control, evaluate, and improve the system performance of sustainable agroindustry, through an integrated approach of transformation process, system engineering, industrial management, and environmental aspects to increase the added value of agricultural/bio-based resources and their derivatives.

Faculty

Faculty members are required to have a combined expertise in the aspects of transformation, systems engineering, industrial management, and environment for developing sustainable and integrated agro-industrial system.

Discipline Criteria for Biomedical and Similarly named Engineering Programs

Lead Society(ies):
○ *Badan Kejuruan Teknik Biomedis Persatuan Insinyur Indonesia (BKTBM PII)* – PII Chapter for Biomedical Engineers,
○ *Perkumpulan Program Studi Teknik Biomedis Indonesia (P2TBI)* – Indonesian Association for Study Program in Biomedical Engineering

Version: 2022

These Discipline Criteria apply to engineering programs that include "biomedical," or similar modifiers in their titles.

Curriculum

The curriculum structure shall provide engineering and science topics in breadth and depth and be consistent with the autonomous professional profile and learning outcomes.

The curriculum shall include experiences in:

1) Application of engineering, physics, mathematics, statistics, biology, physiology, and chemistry principles,
2) Biomedical engineering problem solving, related to the interaction between living and non-living systems,
3) Biomedical engineering devices, systems, components, or processes (hardware and/or software) analysis, modeling, design, and implementation, and
4) Data measurements and interpretation from biomedical or living systems.

Discipline Criteria for Chemical, Biochemical, and Similarly named Engineering Programs

Lead Society(ies):
○ *Asosiasi Pendidikan Tinggi Teknik Kimia Indonesia* (APTEKINDO) – Association of Indonesian Higher Education Programs in Chemical Engineering
○ *Badan Kejuruan Kimia Persatuan Insinyur Indonesia* (BKK PII) – PII Chapter for Chemical Engineers

Version: 2016

These Discipline Criteria apply to engineering programs that include "chemical", "biochemical", "bioprocess", "bioenergy", and similar modifiers in their titles.

Curriculum

The curriculum shall provide a firm grasp in basic sciences which include chemistry and chemistry-related sciences, physics, and/or biology with some reference to local context as appropriate to the objectives of the Program. The curriculum must include the engineering application of these basic sciences to the design, analysis, and control of chemical, physical, and/or biological processes and the design and development of products, including the economics and hazards associated with these processes and products.

The learning process articulating this curriculum must be conducted in such a way to ensure that the graduates have sufficient knowledge, skills, and attitude in the process design, analysis, and control, and product design and development. The learning process must also enable students to apply research-based knowledge and research methods to identify, formulate, and solve engineering problems.

Discipline Criteria for Civil and Similarly named Engineering Programs

Lead Society(ies):
○ *Badan Kejuruan Teknik Sipil Persatuan Insinyur Indonesia* (BKTS PII) – PII Chapter for Civil Engineers
Supporting Society(ies):
○ *Badan Musyawarah Pendidikan Tinggi Teknik Sipil Seluruh Indonesia* (BMPTTSSI) – Indonesian Civil Engineering Higher Education Programs Association

Version: 2016

These Discipline Criteria apply to bachelor programs that include "civil engineering" and similar modifiers in their titles.

Curriculum

The program shall prepare graduates to be proficient in applied mathematics and natural sciences relevant to civil engineering, in a minimum of three recognized major civil engineering areas (namely structural, project management, geotechnical, water resources, environmental, and transportation), in conducting civil engineering experiments and analyzing and interpreting the resulting data, and in designing and integrating all professional components of 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 on design shall have either certification of professional engineer or qualification through experience in engineering design and practices.

Discipline Criteria for Earth and Energy Engineering Programs

Lead Society(ies):
○ *Badan Kejuruan Teknik Kebumian dan Energi* PII – PII Chapter for Earth and Energy Engineers
○ *Ikatan Ahli Geologi Indonesia* – Association of Geological Experts Indonesia
○ Himpunan Ahli Geofisika Indonesia – Association of Geophysical Experts Indonesia

Version: 2019

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 shall have either certification in related earth and energy engineering profession, or professional engineer or qualification through experience in engineering practice.

Discipline Criteria for Electrical, Computer, Communications, Telecommunication and Similarly named Engineering Programs

Lead Society(ies):
○ *Forum Pendidikan Tinggi Teknik Elektro Indonesia* (FORTEI) – Indonesian Forum for Higher Education in Electrical Engineering
○ *Badan Kejuruan Elektro Persatuan Insinyur Indonesia* (BKE PII) – PII Chapter for Electrical Engineers

Version: 2018

These Discipline Criteria apply to engineering programs that include "electrical", "electronic(s)," "computer," "communication(s)," "telecommunication(s)," or similar modifiers in their titles.

Curriculum

The curriculum specifies subject areas appropriate to engineering and must include:

a. 30 credits minimum of a combination of university level mathematics and basic sciences (one with experimental experience) appropriate to the discipline.

b. 45 credits minimum of engineering topics, i.e., engineering sciences and engineering design, appropriate to the title of the program.

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work to meet desired needs within realistic constraints.

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

The curriculum must include probability and statistics, with applications appropriate to the program name; mathematics through differential and integral calculus; basic sciences and engineering topics (including computing science) necessary to analyze and design complex electrical/electronic devices or systems containing hardware and/or software components.

The curriculum for programs containing the modifier "electrical," "electronic(s)," "communication(s)," or "telecommunication(s)" in the title must include advanced mathematics, such as differential equations, linear algebra, and complex variables.

The curriculum for programs containing the modifier "computer" in the title must include discrete mathematics.

The curriculum for programs containing the modifier "communication(s)" or "telecommunication(s)" in the title must include topics in communication systems.

The curriculum for programs containing the modifier “telecommunication(s)” must include design and operation of telecommunication networks for services such as but not limited to voice, data, image, and video transport.

Discipline Criteria for Engineering Physics and Similarly named Engineering Programs

Lead Society(ies):

- *Badan Kejuruan Teknik Fisika Persatuan Insinyur Indonesia (BKTF PII)* – PII Chapter for Engineering Physics

Version: 2016

These Discipline Criteria apply to bachelor programs that include "engineering physics" and similar modifiers in their titles.

Curriculum

The program must prepare graduates to engage in the development of the forefront of technology, such as and not limited to, instrumentation & control, built environment and energy systems, material design and processing, renewable energy

The curriculum must provide strong fundamentals on mathematics, physics, engineering sciences and engineering design. The curriculum shall cover the capability to thrive in professional and industry sectors, such as engineering economics, project management and core competences of the forefront technology.

Faculty

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

Discipline Criteria for Environmental and Similarly named Engineering Programs

Lead Society(ies):
○ *Badan Kejuruan Teknik Lingkungan Persatuan Insinyur Indonesia* (BKTL PII) – PII Chapter for Environmental Engineers
○ *Ikatan Ahli Teknik Penyehatan dan Lingkungan Indonesia* (IATPI) – Indonesian Association of Experts in Sanitation and Environmental Engineering
○ *Badan Kerja Sama Perguruan Penyelenggara Pendidikan Tinggi Teknik Lingkungan* (BAKERMA-TL) – Association of Higher Education Programs in Environmental Engineering

Version: 2016

These Discipline Criteria apply to engineering programs that include "environmental" and similar modifiers in their titles.

Curriculum

The curriculum must prepare graduates to apply knowledge of mathematics and basic sciences; introductory level knowledge of environmental issues associated with air, land, and water systems and associated environmental health impacts; conduct laboratory experiments and analyze and interpret the resulting data in more than one major environmental engineering focus area, (e.g., air, water, land, environmental health); performing design of environmental engineering systems; understanding in advanced principles and practice relevant to the program objectives. The curriculum must prepare graduates to understand concepts of professional practice, project management, and the roles and responsibilities of public institutions and private organizations pertaining to environmental policy and regulations.

Faculty

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

Discipline Criteria for Geodetics, Geomatics, and Similarly named Engineering Programs

Lead Society(ies):

- *Forum Ketua Jurusan dan Program Studi Teknik Geodesi-Geomatika se-Indonesia* – Indonesian Forum for Higher Education in Geodetic-Geomatics Engineering

Version: 2022

These Discipline Criteria apply to engineering programs that include "surveying," "geodetic," "geomatics", and similar modifiers in their titles.

Curriculum

The curriculum must prepare graduates to apply knowledge of mathematics, natural sciences and statistics in Geodetics/Geomatics engineering field, complete task related to spatial data acquisition using modern measurement tools, perform geospatial data processing using industry-standard software, and also perform standard analysis and design in at least one of the recognized technical specialties within surveying/geodetics/geomatics technology, include boundary and/or land surveying, geographic and/or land information systems, engineering project surveying, photogrammetry, remote sensing, mapping and geodesy, and other related areas.

Faculty

The program must demonstrate that a majority of those faculty members are qualified to teach engineering courses by education, equivalent design experience or board certification of a surveyor professional/geomatics engineering.

Discipline Criteria for Industrial and Similarly named Engineering Programs

Lead Society(ies):
○ *Badan Kerja Sama Penyelenggara Pendidikan Tinggi Teknik Industri Indonesia (BKSTI)* – Indonesian Association of Higher Education in Industrial Engineering
○ *Badan Kejuruan Teknik Industri Persatuan Insinyur Indonesia* (BKTI PII) – PII Chapter for Industrial Engineers

Version: 2016

Curriculum

The program shall prepare graduates to be proficient in design, improve, and implement integrated systems that include people, materials, equipment, energy, and information. To meet these needs, the curriculum must provide adequate knowledge about the application of mathematics, statistics, and probabilistic theory as well as analysis and design engineering as well as knowledge with regard to social sciences. The education program shall ensure the provision of an integrated system design experiences to students. The curriculum must include in depth instruction to accomplish the integration of systems using appropriate analytical, computational, and experimental practices.

Faculty

Faculty members must understand the professional practice and maintain currency in their respective professional areas. Faculty members must be responsible and able to make the definition, evaluation, implementation and improvement on the achievement of Learning Outcomes in the framework of an continuous improvement of the study program.

Discipline Criteria for Materials, Metallurgical and Similarly named Engineering Programs

Lead Society(ies):
○ *Badan Kejuruan Teknik Material Persatuan Insinyur Indonesia* – PII Chapter for Material Engineers
○ *Badan Kejuruan Teknik Metalurgi Persatuan Insinyur Indonesia* – PII Chapter for Metallurgical Engineers

Version: 2016

These Discipline Criteria apply to engineering programs including "materials," "metallurgical," "ceramics," "glass", "polymer," "biomaterials," and similar modifiers in their titles.

Curriculum

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

Faculty

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

Discipline Criteria for Mining and Similarly-named Engineering Programs

Lead Society(ies):
○ *Forum Komunikasi Program Studi Teknik Pertambangan seluruh Indonesia* (FORKOPINDO) – Indonesian Higher Education Communication Forum for Mining Engineering Programs
○ *Badan Kejuruan Teknik Pertambangan Persatuan Insinyur Indonesia* (BTP PII) – PII Chapter for Mining Engineers
Supporting Society (ies):
○ *Perhimpunan Ahli Pertambangan Indonesia* (PERHAPI) – Indonesian Association for Mining Experts

Version: 2022

These Discipline Criteria apply to all engineering programs that include “mining” or similar modifiers in their titles.

Curriculum

The program shall prepare graduates to be proficient in mathematics, general chemistry, general physics, and natural sciences, and probability and statistics as applied to mining engineering, in a minimum of three recognized major mining engineering areas (namely mining exploration, mining engineering, and mineral processing); to have fundamental knowledge in the geological sciences including characterization of mineral deposits, physical geology, structural or engineering geology, and mineral and rock identification and properties; to be proficient in statics, dynamics, strength of materials, fluid mechanics; to be proficient in engineering topics related to both surface and underground mining; to be proficient in additional engineering topics such as materials handling, mineral or coal processing, mine surveying, health safety and environment issues and valuation and resource/reserve estimation as appropriate to the program objectives. The laboratory experience must prepare graduates to be proficient in geologic concepts, rock mechanics, and other topics appropriate to the program objectives.

Faculty

Faculty members are required to have a combined expertise in the aspects of mining geology and mining engineering for developing sustainable and integrated mining industry system; the design courses shall be taught by faculty members or practitioners who have either certification of professional engineer or qualification through experience in engineering design and practices.

Discipline Criteria for Mechanical and Similarly named Engineering Programs

Lead Society(ies):
○ *Badan Kerjasama Teknik Mesin Seluruh Indonesia* (BKSTM) – Indonesian Association of Higher Education in Mechanical Engineering
○ *Badan Kejuruan Mesin Persatuan Insinyur Indonesia* (BKM PII) – PII Chapter for Mechanical Engineers

Version: 2016

These Discipline Criteria apply to all engineering programs that include “mechanical” or similar modifiers in their titles.

Curriculum

The curriculum must require students to apply basic sciences, mathematics (including multivariate calculus and differential equations) and principles of engineering sciences; to model, analyze, design, and apply physical systems, components or processes; and prepare students to work professionally in either thermal or mechanical systems.

Faculty

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

Discipline Criteria for Nuclear and Similarly named Engineering Programs

Lead Society(ies):

- *Himpunan Masyarakat Nuklir Indonesia* (HIMNI) – Indonesian Association for Nuclear Society

Version: 2016

These Discipline Criteria apply to engineering program that include “nuclear”, “radiological”, “radiation”, or similar modifiers in their titles.

Curriculum

The curriculum shall provide strong fundamentals on advanced mathematics, science, engineering science and engineering design related to the objectives of the program. The curriculum must include the application of atomic and nuclear physics, and the transport of radiation and its interaction with matter, for nuclear power generation, medical, industrial, and agricultural areas; to perform nuclear engineering design; to measure nuclear and radiation processes. The program shall ensure that the curriculum must comply with international and national nuclear regulations by emphasizing the requirements for nuclear safety, non-destructive inspection, security and safeguards.

Faculty

The program must demonstrate that faculty members are qualified to teach nuclear engineering courses by education, equivalent design experience or board certification of a professional engineer depending on the program needs.

Discipline Criteria for Ocean and Similarly named Engineering Programs

Lead Society(ies):
○ *Himpunan Ahli Pengelola Pesisir Indonesia* (HAPPI) – Indonesian Association of Experts in Coastal Management
○ *Himpunan Ahli Teknik Hidraulik Indonesia* (HATHI) – Indonesian Association of Experts in Hydraulics Engineering

Version: 2016

These Discipline Criteria apply to engineering programs that include “coastal”, “ocean”, “marine”, “naval architecture”, or similar modifiers in their titles.

Curriculum

The curriculum must prepare graduates to have the knowledge and the skills to apply the principles of fluid and solid mechanics, dynamics, hydrostatics, hydrodynamics, probability and applied statistics, oceanography, and water waves, to engineering problems and to work in groups to perform engineering design at the system level, integrating multiple technical areas and addressing design optimization.

Faculty

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

Discipline Criteria for Petroleum and Similarly named Engineering Programs

Lead Society(ies):
○ *Badan Kejuruan Teknik Perminyakan dan Geothermal Persatuan Insinyur Indonesia (PII)* – PII Chapter for Petroleum and Geothermal Engineers
○ *Ikatan Program Studi Teknik Perminyakan Indonesia* (IPSTEKMI) – Indonesian Association for Petroleoum Engineering Programs

Version: 2022

These Discipline Criteria apply to engineering programs that include “petroleum”, “natural gas”, “geothermal”, and similar modifiers in their titles.

Curriculum

The curriculum of the program must have enough courses to cover the following topics:

1) Mathematics through differential equations, probability and statistics, fluid mechanics, strength of materials, thermodynamics, and chemical and physical properties of materials,
2) Design and analysis of well drilling and completion systems,
3) Design and analysis of production, injection, and fluid handling systems,
4) Characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering principles,
5) Application of reservoir engineering principles and practices to optimize sustainable development and management of conventional and unconventional resources,
6) Application of project economics and resource valuation methods for design and decision making subject to risks and uncertainties, and
7) In addition to or embedded in core courses, the curriculum may include innovative applications of recent technology and sciences, such as nanotechnology, big data analytics and artificial intelligence

Faculty

Faculty members must have appropriate competencies and qualifications and sufficient authority toward attaining learning outcomes of the program. The appropriate competencies and qualifications are demonstrated by academic background and degree, while sufficient authority is reflected by academic rank. Other considerations may be based on professional certification and industrial experiences.

Faculty members must have a degree from a similar program or have an area of expertise required by the program. The level of expertise may be based on research and/or work experiences. Permanent faculty members must meet qualifications and academic rank according to applicable regulations. Non-permanent faculty members from industry must have sufficient and necessary experience that is required by the program.

Discipline Criteria for General Engineering Programs

Lead Society(ies):

- *Persatuan Insinyur Indonesia (PII)* – The Institute of Engineers Indonesia

Version: 2019

These criteria is applicable only for programs having no available Discipline Criteria and wish to be evaluated solely by the Common Criteria.

Curriculum

No additional requirement beyond those required by the Common Criteria

Faculty

No additional requirement beyond those required by the Common Criteria