Guide to Criteria for Accrediting Japanese Engineering Education Programs Leading to Bachelor's Degree

Applicable in the year 2008

The original text of "Guide to Criteria for Accrediting Japanese Engineering Education Programs" is written in Japanese. This is English translation of the original text.

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Preamble

These criteria are hereby stipulated for the accreditation of the basic educational programs to develop engineers provided by institutions of higher education. A program seeking accreditation must provide explanations together with supporting materials demonstrating that the program meets all of the following six criteria (including those contained in the "Supplement" if applicable). "Engineers" here refers to engineering professionals as widely defined, including those engaged in research and development works.

[Guide]

These criteria are stipulated for the accreditation of the basic educational programs to develop engineers provided by institutions of higher education, based on Article 4, Constitution of Japan Accreditation Board for Engineering Education (hereinafter called "JABEE"). The programs within the scope of JABEE accreditation are those provided in four-year undergraduate education by universities approved by the authorities. (Those programs that provide two additional years of specialized training on top of the general polytechnic and junior college education are also within the scope). As long as the content of a given program focuses on basic engineering education, it does not matter which faculty within the institutions of higher education officially provides the program.

The term "program" refers not only to the curricula of specific departments, courses or their subdivisions, but also to the entire educational process and its environment, from admission to graduation, including the evaluation of student performance. It is a generic term used to represent departments and courses concerned. Each program must establish specific "learning and educational objectives" that concretize program outcomes, more specifically, knowledge and abilities those to be acquired by the students by the time of graduation from the program. Each program must implements education to achieve the "learning and educational objectives". Curricula must be systematically designed so that the students can achieve the learning and educational objectives. It is important that everyone, including students, involved in a program recognizes what he/she must do to establish and achieve the learning and educational objectives on a regular basis. Students must recognizes the learning and educational objectives to achieve them during the four-year learning and education from the time of enrollment through the time of graduate. The learning and educational objectives has an aspect as a contract between the institution and society, therefore they should be published to society.

"Programs" here are thus not confined to those provided solely by a department within a faculty, as is typically the case with the majority of universities. A program can involve multiple departments, while a department can provide multiple programs. Also, part of a program can

be provided by other universities or institutions under a specific cooperative arrangement. A program must establish a rule regarding transferred students.

It is desirable that the name of program is described on some documents disclosed to the public. The name should be different from those of other programs provided by the same institution. In particular, it must be clearly distinguished from other programs that are not accredited by JABEE. When the program to be accredited is the only program provided by a department, the name of the department is directly employed as the name of the program.
In order for a program to retain accreditation when changes are made to the structure of the program or in other items relating to the Accreditation Criteria, the program must be regarded as substantially equivalent before and after the changes were made.

A program seeking accreditation must provide explanations together with supporting materials demonstrating that the program meets all of the Criteria 1 – 6 (including those contained in the "Supplement" if applicable). To meet this requirement, the program must produce a Self-Inspection Report based on the supporting materials and must undergo a review of this report and an On-site Visit.

The engineers covered by these criteria are engineering professionals as widely defined, including those engaged in research and development work, and including researchers.

1. Criterion 1

Criterion 1: Establishment and Disclosure of Learning and Educational Objectives

(1) For the purpose of fostering self-reliant engineers, the program must establish specific learning and educational objectives that concretize the contents of knowledge and abilities described in items (a) - (h) below. The learning and educational objectives must be disclosed widely on and off campus and must be known to the faculty members and students involved in the program.

(a) An ability and intellectual foundation to consider issues from a global and multilateral viewpoint.
(b) Understanding of the effects and impact of engineering on society and nature, and of engineers' social responsibility (engineering ethics).
(c) Knowledge of mathematics, natural sciences and information technology and an ability to apply such knowledge.
(d) Specialized engineering knowledge in each applicable field, and an ability to apply such knowledge to provide solutions to actual problems.
(e) Design abilities to organize comprehensive solutions to societal needs by exploiting various disciplines of science, engineering and information.
(f) Japanese-language communication skills including methodical writing, verbal presentation and debate abilities, as well as basic skills for international communication.
(g) An ability to carry on learning on an independent and sustainable basis.
(h) An ability to implement and organize works systematically under given constraints.

(2) The learning and educational objectives must be established, giving due consideration to each institution's traditions and resources, to the specific fields in which its graduates are particularly active, and to social needs and students' requirements.

[Guide]
Criterion 1 stipulates requirements for the establishment and disclosure of learning and educational objectives. Items examined under this criterion are the learning and educational objectives established by the program and the state of disclosure and publicity of these objectives.

The "objectives" defined by JABEE are the guidelines that provide evaluation criteria, and refer to specific "learning and educational outcomes (including achievement level)" assured by the program concerned. In particular, they refer to the knowledge and abilities acquired by students at the time of graduation.

The purpose of examination and accreditation is to confirm that a program applying for accreditation has appropriately set its own learning and educational objectives, that it provides

educational activities that will enable students to achieve those objectives, that only the students who achieve the objectives are allowed to complete the program, and that the program makes continuous efforts on an autonomous basis to improve the content of education provided in the program, and to assure the quality of education provided by each accredited program by announcing their program titles to the public. Therefore, learning and educational objectives are a prerequisite for examination and accreditation and are set by the program itself based on its own educational principles. Criterion 1 stipulates the requirements for the established objectives to be judged as "appropriate."

Each program must establish specific learning and educational objectives that concretize the contents of knowledge and abilities described in items (a) – (h), Criterion 1(1), giving due consideration to the institution's principles and traditions and to social needs and students' requirements. These learning and educational objectives must be disclosed widely on and off campus, and must be fully recognized by the faculty members and students involved in the program. Meanwhile, the learning and educational objectives serve the purpose of assuring the public that the graduates of the program acquired a certain level of knowledge and abilities. Because of the nature of these learning and educational objectives, the examination covers not only the contents and level of those objectives but also how successfully they are disclosed and disseminated to the public.

Learning and educational objectives are also a prerequisite for the examinations with respect to Criteria 3,4 and 5. As such, they are required to be concrete enough to serve as the basis to develop the educational content and methods to help students attain the objectives, including the measures to prove the level of individual students' achievement against those objectives. The level of achievement against the learning and educational objectives is a particular focus of the examination on Criterion 5. Therefore, it should be noted that if the learning and educational objectives are not sufficiently concrete, it is difficult to prove the level of achievement.

1) Criterion 1(1)

Criterion 1(1) requires that the program has established learning and educational objectives specific to the program essential for basic education of self-reliant engineers, and that these learning and educational objectives are disclosed on and off campus and are fully recognized by both the faculty members and students involved in the program. In consideration of the nature of the learning and educational objectives, it is in principle necessary for these learning and educational objectives to have been disclosed when students who are in the fourth year at the time of the examination entered the program.

Also Criterion 1(1) indicates, as listed in (a) – (h), the framework, categories and items of the knowledge and abilities that should be contained and concretized when a program establishes specific learning and educational objectives. Items (a) – (h) are expressed in quite abstract terms in order to avoid hampering the diversity of programs. Items (a) – (h) should not be directly interpreted as the learning and educational objectives, but the contents of the respective items should be concretized in the program's learning and educational objectives.

These learning and educational objectives should be sufficiently concrete to measure the students' achievement level.

Each program could establish its learning and educational objectives by describing the concrete content and standards specific to the program that correspond with each of the items listed in (a) – (h). However, programs are not required to follow the (a) – (h) itemization in establishing their learning and educational objectives to concretize the contents of items (a) – (h). The program's objectives can desirably be described following the educational objectives and principles of each Institution.

The items (a) – (h) in Criterion 1(1) are first itemized by major category of human quality, and then by category of professional / engineering requirement, but this does not indicate any order of importance or sequence of educational process. It should also be noted that the items are concerned primarily with basic education, as they cover undergraduate programs.

The intentions of items (a) – (h) in Criterion 1(1) are as follows.

(a) An ability and intellectual foundation to consider issues from a global and multilateral viewpoint.

This item refers to intellectual foundation and thinking power needed by self-reliant individuals who can contribute to the shift from a materially to a spiritually focused society and to the construction of a sustainable society, while being capable of working actively in the global arena. Concrete learning and educational objectives must be established, taking into consideration the contents as outlined [1] - [3] below. It is especially desirable that item [3] is included.

[1] Knowledge regarding various aspects of history, culture, customs, values, climates and economies that leads students to realize that there are diverse concepts of happiness, welfare, prosperity, etc.

[2] Self-awareness concerning one's own happiness, life goals and profiles.

[3] The ability to think not just in terms of one's own (or one's own country's) culture, values and interests, but also from the perspectives of others or other countries.

(b) Understanding of the effects and impacts of engineering on society and nature, and of engineers' social responsibilities (engineering ethics)

This item deals with engineering ethics. That is, it refers to an engineer's understanding of how engineering interacts with nature and society, and of his or her social responsibilities. It may include an understanding of the history of engineering. Helping students understand how engineering interacts with nature and society with respect to a particular field is also acceptable here. It is important to help students prepare themselves to be capable of responsible judgment and behavior as self-reliant engineers. What is required here is an

understanding of practical ethics that can be developed by giving students plenty of opportunities to think on their own.

(c) Knowledge of mathematics, natural sciences and information technology, and an ability to apply such knowledge.

This item refers not only to knowledge of natural sciences such as mathematics, physics, chemistry, biology and earth science, as well as information technology, but also to the ability to apply this knowledge practically. It is required that the learning and educational objectives of the program specifically incorporate the mathematics, natural sciences and information technology content that engineers need.

(d) Specialized engineering knowledge in each applicable field, and an ability to apply such knowledge to provide solutions to actual problems (including the requirements as intended by the Program Criteria by Field)

This item refers to the acquisition of the knowledge required in respective fields of specialization, as well as the ability to apply such knowledge. It is required that the learning and educational objectives include the requirements as intended by the Program Criteria by Field. It is desirable that such objectives as creativity and the ability to set or uncover problems be added here.

(e) Design abilities to develop comprehensive solutions to societal needs by exploiting various disciplines of science, engineering and information

"Design" here signifies "engineering design". It is not limited to the drawing of plans, but 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. "Design ability" refers to the abilities required for developing such solutions. Design education is the most important characteristic of engineering education, and its subjects may relate to either hardware or software (including systems).

Engineering design ability includes:

- ✓ The ability to come up with conceptual ideas;
- ✓ The ability to identify and formulate a problem;
- ✓ The ability to integrate (unify) various scientific and technological knowledge and its application;
- ✓ Creativity;
- ✓ The ability to conceive the problem from the viewpoints of public well-being and safety, culture, economy, environmental impact, ethics etc. and to find a solution to the problem under these constraints;
- ✓ The ability to verify the results;
- ✓ The ability to express and describe the ideas in drawings, sentences, equations, programming etc.;
- ✓ The ability to communicate;

- ✓ The ability to collaborate with others (teamwork); and
- ✓ The ability to continuously plan and to work as planned.

Engineering design requires the integrated harnessing of all these competences, but design ability encompasses a wide range of content and levels. On this basis, with regard to item (e), it is required that the learning and educational objectives are appropriate to undergraduate education and are defined in a concrete manner, taking account the needs of society as well as the Program Criteria by Field.

(f) Japanese-language communications skills including methodical writing, verbal presentation and debate abilities, as well as basic skills for international communication.

This item refers to communication skills in the broad sense of the term. Basic skills for international communications typically signify communication skills in English, but are not necessarily limited to English. The term does not necessarily refer to verbal fluency. Graduates of the program should, after a certain amount of additional training, at least be able to engage in communication on specialized field. This minimum requirement, however, changes with the passage of time, and it is likely that a higher level of communication skills will be required in the future.

(g) An ability to carry on learning on an independent and sustainable basis.

In a globalizing and quickly changing information-oriented society, engineers are required to have the ability to continue learning on an independent basis throughout their careers. That is, they must have the ability to acquire new and appropriate knowledge and relevant information on their own. Students must be encouraged to develop the method and practice of learning on their own initiative through various methods, including lectures, graduate research, experiments, drills, practice exercises and homework.

(h) An ability to implement and organize works systematically under given constraints.

This item refers to an ability to systematically implement work on an independent basis and complete it within a given time limit. Such qualities as cooperativeness to work as a team, including the ability to work with people from other disciplines, as well as leadership can desirably be included here.

2) Criterion 1(2)

Criterion 1(2) requires that the learning and educational objectives are established, giving due consideration to each program's traditions and resources, to the specific fields in which its graduates are particularly active, and to social needs and students' requirements. In other words, it is required that programs have set their specific learning and educational objectives, and that the level and contents of the established objectives reflect social needs and students' requirements. The process of establishing the learning and educational objectives, and the process of giving consideration to the social needs of industries where graduates are

particularly active and to students' requirements to assure the required level, are also important.

The "levels expected by engineering and industrial circles" must be adequately high as levels required for basic education to foster engineers of bachelor-degree level, and they must be adequate for enabling international mutual recognition of substantially equivalent of education programs. Such levels vary from field to field and change with the passage of time, and thus cannot be clearly described in concrete terms. It is expected that in the process of examination and accreditation, the levels envisaged by the Institution and the party responsible for the examination and accreditation will converge within a narrow range, eventually making it possible to assure the quality of education based on the common levels.

Items to be examined under Criterion 1

1(1)[1]: If the program establish the specific learning and educational objectives that concretize the content of knowledge and abilities described in items (a) –(h) for the purpose of fostering self-reliant engineers.

1(1)[1](a) An ability and intellectual foundation to consider issues from a global and multilateral viewpoint.

1(1)[1](b) Understanding of the effects and impact of engineering on society and nature, and of engineers' social responsibilities (engineering ethics).

1(1)[1](c) Knowledge of mathematics, natural sciences and information technology, and an ability to apply such knowledge.

1(1)[1](d) Specialized engineering knowledge in each applicable field, and an ability to apply such knowledge to provide solutions to actual problems.

1(1)[1](e) Design abilities to organize comprehensive solutions to societal needs by exploiting various disciplines of science, engineering and information.

1(1)[1](f) Japanese-language communications skills including methodical writing, verbal presentation and debate abilities, as well as basic skills for international communication.

1(1)[1](g) An ability to carry on learning on an independent and sustainable basis.

1(1)[1](h) An ability to implement and organize works systematically under given constraints.

1(1)[2] If the learning and educational objectives are disclosed widely on and off campus.

1(1)[3] If the learning and educational objectives are known to the faculty members and students involved in the program.

1(2)[1] If the learning and educational objectives are established, giving due consideration to each institution's tradition and resources and to the specific fields in which its graduates are particularly active.

1(2)[2] If the learning and educational objectives are established, giving due consideration to social needs and students' requirements.

Criterion 2: Quantitative Curriculum Requirements

Criterion 2: Quantitative Curriculum Requirements

(1) The program must comprise the equivalent of four years of undergraduate study / education, and must qualify as graduates those students who have achieved a bachelor's degree after earning 124 or more credit units.

(2) The curriculum must comprise a total of at least 1,800 contact hours (class hours as well as study hours under faculty guidance). Moreover, this must include at least 250 hours of study in the humanities and social sciences, etc. (including language studies), at least 250 hours of study in mathematics, natural sciences and information technology, and at least 900 hours of study in the field of specialization.

[Guide]
Criterion 2 stipulates the Quantitative Curriculum Requirements. Examined items here are the quantitative conditions for graduating the program and contact hours.

1) Criterion 2 (1)
Credits earned in four-year undergraduate programs at universities and those earned in the upper grades (fourth and fifth grade) plus two-year advanced courses at colleges of technology are treated equally. Furthermore, credits earned in a subject in the third grade of colleges of technology can also be included, provided that the program concerned can prove that the level of educational content is equivalent to that provided in undergraduate education.

2) Criterion 2 (2)
Contact hours mean class and study hours under the guidance of faculty and the like. "Faculty and the like" is defined as persons who provide substantial supervision and guidance to student learning. Specifically, it includes faculty, engineering staff and teaching assistants (TAs) at institutions of higher education, as well as instructors at cooperating companies who provide substantial supervision and guidance to students during off-campus training in internships. However, in order for contact hours where persons other than faculty are supervising and guiding student learning to be counted in the study hours, a system must be established so that faculty members can respond to consultation and questions by the students.

It is important that the institution provide a form of education, particularly in engineering education, in which students are encouraged by faculty instruction and guidance to study spontaneously and independently, rather than a form of education simply comprising unilateral conveyance of knowledge. In encouraging students to study on their own initiative, it is considered important to provide a bilateral form of education that responds to the questions and requests from the students with regard to the contents of instruction and guidance. This is why each program should provide a combination of various forms of education, such as

lectures, laboratory works, practice exercises, projects and graduation theses, whereby faculty are engaged not only in delivering knowledge but also in guiding the students to study independently and spontaneously towards enlightenment. Thus, a responsible basic education program designed to foster self-reliant engineers is required to provide at least 1,800 full hours of such instruction and guidance. The official "University Establishment Standards" state that in setting the number of credit units, each credit unit should consist of content requiring 45 hours of study. If this standard is followed, the number of study hours required to obtain a bachelor's degree is 124 credit units' worth, or 5,580 hours, which includes self-study time and preparation and review of classes.

The forms of education and learning in which students are instructed and guided by faculty and the like include learning utilizing new educational technologies such as distance-learning systems or information network environments (so called "e-learning"), as well as off-campus learning and education in close collaboration with external partners, such as internships. It may be possible that faculty and the like provide guidance to student leaning via information network environment, allowing latitude in physical places and time. Study hours under such conditions can be counted in contact hours provided that the program demonstrates some evidence which shows the learning is under faculty guidance. Adoption of these inventive ways to provide education is to be respected from the aspect of accreditation.

Credits of compulsory subjects taken by all students of the program can be counted in credit hours. Credits of elective subjects can be counted in credit hours only when all students of the program do leaning for the equivalent hours and it is demonstrated with some evidences.

The headings given to each subdivided category of the aforementioned contact hours, such as "the humanities and social sciences, etc. (including language studies)", "mathematics, natural sciences and information technology" and "study in the field of specialization", refer to the concrete content of learning, not to the classification of course subjects or organizational framework within the Institution. For example, even if a subject titled "engineering ethics" is officially established within the category of "study in the field of specialization", it can, depending on the content, still be counted in the category of "the humanities and social sciences (including language studies)". Furthermore, contact hours can be subdivided even within a subject, according to content, into a few categories for the purpose of counting. However, double counting of the hours for the same learning content in two or more categories is not allowed.

When study hours in forms other than lectures, practical exercises, experiments, projects, etc. are counted in the contact hours, equivalent contact hours must be calculated based on the effectiveness of each form of education. The program should demonstrate the equivalence of learning and educational effectiveness of each form of education with, from the view point of bi-directionality of education. Some points of notes when calculating contact hours are shown in the following table:

Form of education provided	Points of note when calculating contact hours
Graduation research at laboratories, etc.	Actual hours spent on investigation, research, report writing, etc. led by faculty instruction and guidance for this research
Lectures at other universities, etc	Evaluation of effectiveness in terms of the program's learning and educational objectives
Internships, etc.	Hours when students can actually have guidance from supervisors
Lectures, etc. provided via video, the Internet, the University of the Air, etc. as part of the curriculum prepared by instructors, but not allowing any questions from students	The degree to which a bilateral form of education is ensured, such as responding to questions and requests from the students
Internet-based practice exercises allowing questions from students	The degree to which a bilateral form of education is ensured, such as responding to questions and requests from the students
Tours of facilities led by faculty, etc.	Actual hours spent touring facilities

Items to be examined under Criterion 2

2(1): If the program comprises the equivalent of four years of undergraduate study / education, and qualifies as graduates those students who have achieved a bachelor's degree after earning 124 or more credit units.

2(2)[1]: If the program comprises a total of at least 1,800 contact hours (class hours as well as study hours under faculty guidance).

2(2)[2]: If the program includes at least 250 hours of study in the humanities and social sciences, etc. (including language studies).

2(2)[3]: If the program includes at least 250 hours of study in mathematics, natural sciences and information technology.

2(2)[4]: If the program includes at least 900 hours of study in the field of specialization.

3. Criterion 3: Educational Methods

Criterion 3: Educational Methods

3.1 Admission and Enrollment

(1) The program must establish specific procedures to attract students with adequate qualifications and resources as required to achieve the learning and educational objectives. These procedures must be disclosed on and off campus. The selection process of the students must be in accordance with these procedures.

(2) In the case where students are enrolled in the program after completing general education courses, etc., the program must establish specific procedures for selecting students for admission to the program, taking into consideration the fact that the students' performance in learning including general education courses from the time of their admission to the institution should be examined. The procedures must be displayed to the faculty members and students involved in the program. The selection of such students must be in accordance with these procedures.

(3) The program must establish specific procedures for admission of transfer students in the case where transfer students are accepted. The procedures must be displayed on and off campus. The admission of such transfer students must be in accordance with these procedures.

3.2 Educational Methods

(1) The program's curriculum must be designed to ensure that students achieve the program's learning and educational objectives. Moreover, the curriculum must be displayed to the faculty members and students involved in the program. The corresponding relationship between each subject and the program's learning and educational objectives must clearly be shown in the curriculum.

(2) A syllabus must be prepared for each subject based on the curriculum design and must be displayed to the faculty members and students involved in the program. Educational activities must be implemented in accordance with the syllabus. The syllabus for each subject must clearly indicate how each subject is positioned within the curriculum, and must also indicate the educational content and methods, the goals to be achieved, as well as the methods and criteria for evaluating students' performance.

(3) The program must establish a system that enhances students' understanding of class work and other program content, promoting students' enthusiasm to learn, while coping with students' requests. The structures of this system must be displayed to the faculty members and students involved in the program, and the necessary activities must be implemented.

(4) The students must be allowed to regularly assess their own level of achievement against the program's learning and educational objectives, for motivation and orientation in their own study.

3.3 Educational Organization

(1) The program must provide sufficient numbers of talented faculty, coupled with an educational support system, to deploy the curriculum designed to achieve the learning and educational objectives of the program, by means of appropriate educational methods to attain actual educational results.

(2) The program must establish a faculty development system designed to improve the quality of the faculty, and display it to the faculty members involved in the program. The necessary activities must be implemented.

(3) The program must establish an evaluation method to determine the educational contributions of each faculty member and display it to the faculty members involved in the program. The evaluation of educational contributions must be implemented in accordance with the method.

(4) The program must establish an intra-faculty liaison network system to ensure closer coordination among the subjects within the curriculum, while enhancing and improving the effectiveness of the program. The program must implement activities relevant to such a system.

[Guide]
Criterion 3 stipulates Educational Methods. Admission and enrollment, educational methods, and educational organization are examined here.

3.1. Admission and Enrollment

Criterion 3.1(1)
Does the program establish an "admission policy" designed to attract students with adequate qualifications and resources as required to achieve the learning and educational objectives? Furthermore, does it establish specific student selection methods to realize its admission policy? Are the admission policy and the selection methods disclosed on and off campus? Is the selection of such students in accordance with the selection methods?

As for "a rule regarding transferred students" mentioned in the [Guide] of Preamble, in the case where there are some concerns in the contents and appropriateness of the operation of the rule, such concerns examined under Criterion 3.1(1). Appropriateness of the operation means if the number of transferred students is appropriate.

Criterion 3.1(2)

In the case where students are enrolled in the program after completing general education courses, etc., does the program establish specific procedures for selecting students for admission to the program, taking into consideration the fact that the students' performance in learning including general education courses from the time of their admission to the institution should be examined? Are the procedures displayed to the faculty members and students involved in the program? Also, is the selection of such students in accordance with these procedures?

In principle, students to be enrolled in the program should be selected by the beginning of the third academic year after their admission to the institution at the latest, and the roster of enrolled students should always be clear.

Criterion 3.1(3)
Does the program establish specific procedures for admission of transfer students in a case where transfer students are accepted? Are the procedures displayed on and off campus? Is the admission of such transfer students in accordance with these procedures?

3.2. Educational Methods

Criterion 3.2(1)
Is the program's curriculum designed to ensure that students achieve the program's learning and educational objectives? Is the curriculum displayed to the faculty members and students involved in the program? Also, is the corresponding relationship between each subject and the program's learning and educational objectives clearly shown in the curriculum?

In setting the curriculum, it is necessary to take into consideration the knowledge and abilities etc. that the students possess at the time of admission. While the level of the learning and educational objectives are determined according to the principles adopted by each Institution, the level must be not lower than the societal requirement levels.

Although the corresponding relationship between each subject and the learning and educational objectives should be clearly shown in the curriculum, it is not necessary for each subject in the curriculum to correspond to specific learning or educational objectives on a one-to-one basis. An objective can be covered by a single subject. Or some objectives can be covered by a group of classes or by graduation thesis projects. The program must not only formally define the subjects designed to cover each objective, but demonstrate concretely how much knowledge and ability are actually acquired by the students. With regard to the form of graduation research projects, the corresponding objectives should be defined, and a scheme to show how much knowledge and ability are actually acquired by the students should be prepared.

The foundation of engineering design education is the cultivation of the ability to solve problems by synthesizing the numerous abilities that result from engineering education ("synthesized ability"). In cases where the engineering design education is implemented in plural subjects, it is necessary to pay attention to whether the program cultivates synthesized

ability (do the students acquire design experience, for example?), and in cases where engineering design education is implemented in graduation research projects, it is necessary to pay attention to whether all students receive appropriate design education.

Criterion 3.2(2)
Is a syllabus prepared for each subject based on the curriculum design? Is the syllabus displayed to the faculty members and students involved in the program? Are the educational activities implemented in accordance with the syllabus?

The syllabus for each subject must clearly indicate how each subject is positioned within the curriculum, and must also indicate the educational content and methods, the goals to be achieved, as well as the methods and criteria for evaluating students' performance. The educational content and evaluation methods and criteria must be established, taking into consideration the societal requirement levels.

Criterion 3.2(3)
Does the program establish a system that enhances students' understanding of class work and other program content, promoting students' enthusiasm to learn, while coping with students' requests? Are the structures of this system displayed to the faculty members and students involved in the program? Are the necessary activities implemented?

Criterion 3.2(4)
Are students allowed to regularly assess their own level of achievement against the program's learning and educational objectives, for motivation and orientation in their own study?

3.3. Educational Organization

Criterion 3.3(1)
Does the program provide sufficient numbers of talented faculty, coupled with an educational support system, to deploy the curriculum designed to achieve the learning and educational objectives of the program, by means of appropriate educational methods to attain actual educational results?

Selection of individual faculty member is a basic issue for educational organizations, and each educational institution can take the initiative in deciding it. The program must provide sufficient numbers of talented faculty, coupled with an educational support system to achieve the learning and educational objectives of the program, referring to "University Establishment Standard" or "Technical College Establishment Standard" as the minimum requirement.

Criterion 3.3(2)
Does the program establish a faculty development system designed to improve the quality of faculty, and display it to the faculty members involved in the program? Are the necessary activities implemented?

Criterion 3.3(3)

Does the program establish an evaluation method to determine the educational contributions of each faculty member, and display it to the faculty members involved in the program? Is the evaluation of educational contributions implemented in accordance with the method?

The aims of evaluating educational contributions are to enhance faculty's motivation and to promote high quality education. It intends to pay due recognition to faculty's educational activities as job performance as well as to share good practice with other faculty members through the faculty development system.

Criterion 3.3(4)
Does the program establish an intra-faculty liaison network system to ensure closer coordination among the subjects within the curriculum, while enhancing and improving the effectiveness of the program? Does the program display it to the faculty members involved in the program, and implement activities relevant to such a system?

Items to be examined under Criterion 3
3.1(1)[1] If the program establishes specific procedures to attract students with adequate qualifications and resources as required to achieve the learning and educational objectives.
3.1(1)[2] If these procedures are displayed on and off campus.
3.1(1)[3] If the selection process of the students is in accordance with these procedures.
3.1(2)[1] In the case where students are enrolled in the program after completing general education courses, etc., if the program establishes specific procedures for selecting students for admission to the program, taking into consideration the fact that the students' performance in learning including general education courses from the time of their admission to the institution.
3.1(2)[2] If the procedures are displayed to the faculty members and students involved in the program.
3.1(2)[3] If the selection of such students must be in accordance with these procedures.
3.1(3)[1] If the program establishes specific procedures for admission of transfer students in the case where transfer students are accepted.
3.1(3)[2] If the procedures must be displayed on and off campus.
3.1(3)[3] If the admission of such transfer students must be in accordance with these procedures.
3.2(1)[1] If the program's curriculum is designed to ensure that students achieve the program's learning and educational objectives.
3.2(1)[2] If the curriculum is displayed to the faculty members and students involved in the program.
3.2(1)[3] If the corresponding relationship between each subject and the program's learning and educational objectives is clearly shown in the curriculum.
3.2(2)[1] If a syllabus is prepared for each subject based on the curriculum design.
3.2(2)[2] If the syllabus is displayed to the faculty members and students involved in the program.
3.2(2)[3] If educational activities is implemented in accordance with the syllabus.
3.2(2)[4] If the syllabus for each subject clearly indicates how each subject is positioned within the curriculum, and also indicates the educational content and methods, the goals to be

achieved, as well as the methods and criteria for evaluating students' performance.

3.2(3)[1] If the program establishes a system that enhances students' understanding of class work and other program content, promoting students' enthusiasm to learn, while coping with students' requests.

3.2(3)[2] If the structures of this system is displayed to the faculty members and students involved in the program.

3.2(3)[3] If the necessary activities is implemented.

3.2(4)[1] If the students are allowed to regularly assess their own level of achievement against the program's learning and educational objectives.

3.2(4)[2] If the own assessment is reflected for their motivation in their own study.

3.3(1) If the program provides sufficient numbers of talented faculty, coupled with an educational support system, to deploy the curriculum designed to achieve the learning and educational objectives of the program, by means of appropriate educational methods to attain actual educational results.

3.3(2)[1] If the program establishes a faculty development system designed to improve the quality of the faculty.

3.3(2)[2] If the faculty development system is displayed to the faculty members involved in the program.

3.3(2)[3] If the necessary activities are implemented.

3.3(3)[1] If the program establishes an evaluation method to determine the educational contributions of each faculty member.

3.3(3)[2] If the evaluation method is displayed to the faculty members involved in the program.

3.3(3)[3] If the evaluation of educational contributions is implemented in accordance with the method.

3.3(4)[1] If the program establishes an intra-faculty liaison network system to ensure closer coordination among the subjects within the curriculum, while enhancing and improving the effectiveness of the program.

3.3(4)[2] If the intra-faculty liaison network system is displayed to the faculty members involved in the program.

3.3(4)[3] If the program implements activities relevant to such a system.

4. Criterion 4: Educational Environment

Criterion 4: Educational Environment

4.1 Facilities and Equipment

(1) The program must have sufficient classrooms, laboratories, practice rooms, libraries, information technology facilities, study rooms, rest areas, cafeterias, and other relevant facilities and equipment as required for achieving the program's learning and educational objectives.

4.2 Financial Resources

(1) The program must endeavor to secure adequate financial resources to provide, maintain and operate the facilities and equipment as needed to achieve the program's learning and educational objectives.

4.3 Student Support System

(1) Concerning the educational environment, the program must provide a system that promotes students' enthusiasm to learn while attending to students' requests, and display the system to the faculty members, office staff, and students involved in the program. The necessary activities must be implemented.

[Guide]
To be sure, the educational environment cannot easily be changed or improved solely through efforts on the side of the program. Nevertheless, the implementation of the examination can help the staff engaged in the program to appreciate the actual conditions of the program, while the results of the examination can provide them with the data and opportunity to launch negotiations with the senior institution authorities for improvement, which is a significant additional benefit of the examination. What matters most important is whether an effort for improvement is actually being made.

4.1. Facilities and Equipment

Criterion 4.1(1)
Does the program provide sufficient classrooms, laboratories, practice rooms, libraries, IT facilities, study rooms, rest areas, cafeterias, and other relevant facilities and equipment as required for achieving the program's learning and educational objectives?

Facilities and equipment in particular are examined on-site to confirm that they are spacious enough and allow students to conduct laboratory works safely. Official "university establishment standards" serve as the benchmark to evaluate whether the area of a facility meets the standard.

4.2. Financial Resources

Criterion 4.2(1)
Does the program endeavor to secure adequate financial resources to provide, maintain and operate the facilities and equipment as needed to achieve the program's learning and educational?

4.3. Student Support System

Criterion 4.3(1)
Concerning the educational environment, does the program provide a system that promotes students' enthusiasm to learn while attending to students' requests? Does the program display the system to the faculty members, office staff and students involved in the program? Are necessary activities implemented?

Items to be examined under Criterion 4
4.1(1) If the program has sufficient classrooms, laboratories, practice rooms, libraries, information technology facilities, study rooms, rest areas, cafeterias, and other relevant facilities and equipment as required for achieving the program's learning and educational objectives.
4.2(1) If the program endeavors to secure adequate financial resources to provide, maintain and operate the facilities and equipment as needed to achieve the program's learning and educational objectives.
4.3(1)[1] Concerning the educational environment, if the program provides a system that promotes students' enthusiasm to learn while attending to students' requests.
4.3(1)[2] If the system is displayed to the faculty members, office staff, and students involved in the program.
4.3(1)[3] If the necessary activities is implemented.

5. Criterion 5: Evaluation of Students' Level of Achievement against the Learning and Educational Objectives

Criterion 5: Evaluation of Students' Level of Achievement against the Learning and Educational Objectives

(1) The program must evaluate students' level of achievement against the objectives for each subject in accordance with the evaluation methods and criteria described in the syllabi.

(2) The program must provide methods of evaluating credit units earned by the program students at other institutions of higher education, and such credit units must be converted according to such methods. Also the program must provide methods of evaluating credit units earned by transferred students at other institutions prior to their admission to the program, and such credit units must be converted according to such methods.

(3) The program must establish methods and criteria for comprehensively evaluating the level of students' achievement against each learning and educational objective of the program. The evaluations must be carried out according to such methods and criteria.

(4) All graduates of the program must have achieved all of the program's learning and educational objectives.

[Guide]
Students' level of achievement against the "objectives," in other words the concrete outcomes (and level) acquired through the learning and education that is assured by the program is examined.

The Applicant Institution must prove that all graduates have achieved all of the learning and educational objectives established by the program. The Institution must establish the proving methods and the achievement level, as in the case of developing educational methods, and these must be adequate from the perspective of a third party. It is required that the graduates of the program are actually exists, and these graduate were actually evaluated, and the evidence materials are available for proving that all graduate of the program have achieved the learning and educational objectives. Materials such as answer sheets and reports, etc. for cases on the borderline between pass and fail are especially important and carefully examined to determine the adequacy of the achievement level.

In a case where a program has no graduates, the program should have students who have substantially completed the program (hereinafter referred to as "substantial graduates"). In this case, the achievement level of the substantial graduates against the learning and educational objectives are examined. The definition of substantial graduate is "a graduate who has completed a substantial equivalent education with the examined program." In other words, if the student has acquired approximately 70% to 80% of the knowledge and abilities required for completion of the examined program, the student is regarded as a substantial graduate.

Criterion 5(1)
Does the program evaluate students' level of achievement against the objectives for each subject in accordance with the evaluation methods and criteria described in the syllabi? Attention must also be paid to the levels of evaluation methods and criteria established in the syllabi from the standpoint of evaluating the level of achievement against the objectives for each subject.

Criterion 5(2)
Does the program provide methods of evaluating the credit units earned by the program students at other institutions of higher education, as well as the credit units earned by transferred students prior to their admission to the program, and are such credit units converted according to such methods?

Criterion 5(3)
Has the program established methods and criteria for comprehensively evaluating the level of students' achievement against each learning and educational objective of the program? And is the evaluation carried out according to such methods and criteria? In addition to combining the evaluations conducted for each subject, comprehensive evaluation means making use of a variety of evaluation methods depending on the learning and educational objective, for example, giving consideration to the weighting of each subject or the results of external examinations or conducting examinations to test the students' overall level of achievement.

When a graduate research thesis is presented as evidence of engineering design ability, the examination covers the subject of the design as well as whether or not the thesis proves sufficiently the design ability associated with Criterion 1(1)(e). In this case, the graduate research thesis must be evaluated from the standpoint of the learning and educational objectives established in relation to design ability.

Criterion 5(4)
Is a scheme established to confirm whether all graduates of the program have achieved all of the program's learning and educational objectives? Is the program completion judged on the basis of such a scheme?

Criterion 5 intends the relevancy among "To achieve objectives of respective subjects," "To comprehensively achieve the learning and educational objectives of the program" and "all the graduates of the program to achieve the learning and educational objectives of the program."

Items to be examined under Criterion 5
5(1) If the program evaluates students' level of achievement against the objectives for each subject in accordance with the evaluation methods and criteria described in the syllabi.
5(2)[1] If the program provides methods of evaluating credit units earned by the program students at other institutions of higher education. If the program provides methods of evaluating credit units earned by transferred students at other institutions prior to their

admission to the program.

5(2)[2] If such credit units are converted according to the provided methods.

5(3)[1] If the program establishes methods and criteria for comprehensively evaluating the level of students' achievement against each learning and educational objective of the program.

5(3)[2] If the evaluations are carried out according to the established methods and criteria.

5(4)[1] If the program provides a system to confirm that all graduates of the program have achieved all of the program's learning and educational objectives.

5(4)[2] If the students' graduation are determined in accordance with the provided system.

6. Criterion 6: Educational Improvement

Criterion 6: Educational Improvement

6.1 Educational Feedback System

(1) The program must provide an educational feedback system that examines the program in accordance with Criteria 1 – 5 on the basis of the results of evaluation regarding the level of student achievement against the learning and educational objectives. Also the program must display the system to the faculty members involved in the program. The necessary activities must be implemented.

(2) The educational feedback system must be designed and actually operated to attend to societal needs and students' requests, as well as to check the functions of the system itself.

(3) The records of the activities such as meetings and committees, etc comprising the educational feedback system must be viewable by the faculty members involved in the program.

6.2 Continuous Improvement

(1) The program must provide a system that continuously improves the program in accordance with Criteria 1 – 6 on the basis of the educational feedback. The necessary activities must be implemented.

[Guide]
Does the program establish an educational feedback system and continuous improvement system? Are necessary activities implemented? "Program," which is the subject of the feedback system and the improvement system, includes all educational processes and the educational environment from students' enrollment through graduation.

6.1. Educational Feedback System

Criterion 6.1(1)
Does the program provide an educational feedback system that examines the program in accordance with Criteria 1 – 5 on the basis of the results of evaluation regarding the level of student achievement against the learning and educational objectives? Does the program display the system to the faculty members involved in the program? Are the necessary activities implemented?

Criterion 6.1(2)

Is the educational feedback system designed, and actually operated, to attend to societal needs and students' requests, as well as to check the functions of the system itself?

Criterion 6.1(3)
Are the records of the activities such as meetings and committees, etc comprising the educational feedback system viewable by the faculty members involved in the program?

6.2. Continuous Improvement

Criterion 6.2(1)
Does the program provide a system that continuously improves the program in accordance with Criteria 1 – 6 on the basis of the educational feedback? Are the necessary activities implemented?

Items to be examined under Criterion 6
6.1(1)[1] If the program provides an educational feedback system that examines the program in accordance with Criteria 1 – 5 on the basis of the results of evaluation regarding the level of student achievement against the learning and educational objectives.
6.1(1)[2] If the program display the system to the faculty members involved in the program.
6.1(1)[3] If the necessary activities are implemented.
6.1(2)[1] If the educational feedback system is designed and actually operated to attend to societal needs and students' requests.
6.1(2)[2] If the educational feedback system is designed to check the functions of the system itself.
6.1(3) If the records of the activities such as meetings and committees, etc comprising the educational feedback system are viewable by the faculty members involved in the program.
6.2(1)[1] If the program provides a system that continuously improves the program in accordance with Criteria 1 – 6 on the basis of the educational feedback.
6.2(1)[2] If the necessary activities are implemented.

7. Supplement: Program Criteria by Field

Supplement: Program Criteria by Field
Program Criteria by Field provide supplementary guidelines for applying the Accreditation Criteria to programs in a specific field. Program Criteria by Field shall primarily address matters regarding the learning and educational objectives [i.e. Criterion 1 (1) (d), etc.], and the faculty [i.e. Criterion 3.3 (1), etc.].

[Guide]
Program Criteria by Field provide supplementary guidelines for applying the Accreditation Criteria to programs in a specific field. The examination covers the knowledge and abilities to be acquired in each field and the faculty members.

Program Criteria by Field shall primarily address matters regarding the Learning and Educational Objectives [i.e. Criterion 1 (1) (d), etc.] and the faculty [i.e. Criterion 3.3 (1) etc.]. It should be noted that in some fields, Program Criteria by Field may apply not only to Criterion 1 (1) (d) but also to Criterion 3.2 (Educational Methods), etc. Examinations on the Program Criteria by Field are conducted within the scope of Criteria 1 through 6.

Items to be examined under Supplement (Program Criteria by Field)
1 the knowledge and abilities to be acquired in the field
2 the faculty members