JABEE Category- and Discipline-specific Criteria for Accreditation of Professional Education Programs

Applicable in the year 2019 and later

The Japanese version of “JABEE Category- and Discipline-specific Criteria for Accreditation of Professional Education Programs applicable in the year 2019 and later” is official.

This English translation is for informational purpose only.

JABEE

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for Accreditation of Professional Education Programs
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Chapter 1 Purpose

This Category/ Discipline-specific Criteria defines necessary items for evaluation and accreditation by application of JABEE Common Criteria.

Chapter 2 Terminology

1. “Requirements” defined in this document is treated as equivalent as Common Criteria and addendum to each category of accreditation in Common Criteria 2.1.
2. “Highly recommended Items/ Items to be Considered” defined in this document provides perspective of Common Criteria on each Category of Accreditation and are the elements for holistic judgment.

Chapter 3 Requirements for Application of Criteria

“Requirements” for each category of accreditation are defined in the appendices 1 to 4 below:

1. Appendix 1-1: Engineering Education Programs at Bachelor Level,
2. Appendix 2-1: Engineering Education Programs at Master Level,
3. Appendix 3-1: Computing & IT-related Education programs at Bachelor Level,
4. Appendix 4-1: Architectural and Architectural Engineering Education Programs at Bachelor and Master Level.

Chapter 4 Highly Recommended Items/ Items to be Considered for the Application of Criteria

Highly Recommended Items/ Items to be Considered by each Category of Accreditation are defined in the appendices (1) to (4) below:

1. Appendix 1-2: Engineering Education Programs at Bachelor Level,
2. Appendix 2-2: Engineering Education Programs at Master Level,
3. Appendix 3-2: Computing & IT-related Education programs at Bachelor Level,
4. Appendix 4-2: Architectural and Architectural Engineering Education Programs at Bachelor and Master Level.

Chapter 5 Highly Recommended Items/ Items to be Considered by Discipline

Highly Recommended Items/ Items to be Considered by Discipline for the application

of Common Criteria are defined below:

1. For Engineering Education Programs at Bachelor Level, Highly Recommended Items / Items to be Considered are defined in the appendices 1-3-1 to 1-3-16 below:

Appendix 1-3-1 Chemical and Chemistry-Related Engineering
Appendix 1-3-2 Mechanical Engineering
Appendix 1-3-3 Materials and Metallurgical Engineering
Appendix 1-3-4 Resources and Geological Engineering
Appendix 1-3-5 Communication, Computer, Software, and similarly named Engineering
Appendix 1-3-6 Electrical, Electronic and similarly named Engineering
Appendix 1-3-7 Civil Engineering
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Appendix 1-3-9 Multi- and/or Trans-disciplinary Engineering, and New-disciplinary Engineering
Appendix 1-3-10 Architecture and Building Engineering
Appendix 1-3-11 Engineering Physics and Applied Physics
Appendix 1-3-12 Industrial Engineering and Management
Appendix 1-3-13 Agricultural Science and Engineering
Appendix 1-3-14 Forest Engineering
Appendix 1-3-15 Environmental Engineering
Appendix 1-3-16 Biochemical, Biological and Biophysical Engineering

2. For Engineering Education Programs at Master Level, no Highly Recommended Items are defined.

3. For Computing & IT-related Education Programs at Bachelor Level, Highly Recommended Items are defined in the appendices 3-3-1 to 3-3-4 below:

Appendix 3-3-1 Computer Science
Appendix 3-3-2 Information Systems
Appendix 3-3-3 Information Technology/ Cyber Security
Appendix 3-3-4 Computing General

4. For Architectural and Architectural Engineering Education Programs at Bachelor and Master Level, Items to be Considered are defined in the appendix 4-3-1 below:

Appendix 4-3-1 Architectural Design and Planning

Appendix 1-1 Requirements for Engineering Education Programs at Bachelor Level

Related Criterion	Requirements for Engineering Bachelor Category
Criterion 2.1	There are no additional requirements to the Common Criteria.

Appendix 1-2 Highly Recommended Items/ Items to be Considered for Engineering Education Programs at Bachelor Level

Related Criterion	Highly Recommended Items/ Items to be Considered for Engineering Bachelor Category
Criterion 1.2(a)	The program shall define the learning outcomes related to “(a) An ability of multi-dimensional thinking with knowledge from global perspective” by giving consideration on the following items.
	・Knowledge of diverse culture and society of mankind as well as nature ・An ability to take appropriate actions based on the knowledge mentioned above
Criterion 1.2(b)	The program shall define the learning outcomes related to “(b) An ability of understanding of effects and impacts to the society and to the nature of professional activities, and understanding of professionals’ social contributions and responsibilities” by giving consideration on the following items.
	・Understanding of impact of technology of related engineering disciplines on public welfare ・Understanding of implication of technology of related engineering disciplines on environmental safety and sustainable development of society ・Understanding of engineering ethics ・An ability to take actions based on the understanding mentioned above
Criterion 1.2(c)	The program shall define the learning outcomes related to “(c) Knowledge of mathematics, natural science and information technology, and ability to apply” by giving consideration on the following items.
	・Knowledge of mathematics and natural sciences required in the related engineering disciplines ・An ability to apply the knowledge mentioned above including the combination of the knowledge
Criterion 1.2 (d)	The program shall define the learning outcomes related to “(d) Knowledge of the related professional fields, and ability to apply” by giving consideration on the following items.
	・Specialized knowledge required in the related engineering disciplines ・An ability to apply the knowledge mentioned above including the combination of the knowledge ・An ability to utilize hardware and software required in the related engineering disciplines
Criterion 1.2 (e)	The program shall define the learning outcomes related to “(e) Design ability to meet the requirements of the society by utilizing various sciences, technologies and information” by giving consideration on the following items.

	・ An ability to recognize problems to be solved ・ An ability to specify constraints from public welfare, environmental safety, and economy to be taken in account ・ An ability to logically specify, organize and analyze problems ・ An ability to prepare detailed plans toward problem-solving by taking account of various constraints and applying systematic knowledge of mathematics, natural sciences and technology in the related engineering disciplines ・ An ability to solve problems in accordance with the plan
Criterion 1.2 (f)	The program shall define the learning outcomes related to “(f) Communication skills including logical writing, presentation and debating” by giving consideration on the following items.
	・An ability to deliver information and opinions to others ・An ability to understand information and opinions delivered by others ・An ability to exchange information and opinions by utilizing foreign languages such as English
Criterion 1.2 (g)	The program shall define the learning outcomes related to “(g) An ability of learning independently and continuously” by giving consideration on the following items.
	・Understanding of necessity of continuous professional development for a life-long engineer ・An ability to acquire necessary information and knowledge
Criterion 1.2 (h)	The program shall define the learning outcomes related to “(h) An ability to manage and accomplish tasks in a planned way under given constraints” by giving consideration on the following items.
	・An ability to accomplish tasks as planned systematically under given constraints including time and cost ・An ability to understand the progress of the plan and modify as required
Criterion 1.2 (i)	The program shall define the learning outcomes related to “(i) An ability to work in a team” by giving consideration on the following items.
	・An ability to precisely determine own work and carry out during collaborative work ・An ability to appropriately determine what others should do and to encourage the involvement of others during collaborative work

Appendix 1-3-1 Highly Recommended Items for Chemical and Chemistry-Related Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Chemical and Chemistry-Related Engineering	Criterion1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	(1) Engineering Fundamentals: Applied (industrial) mathematics, applied statistics, (experimental design, quality management), measurement (electrical engineering), materials science & mechanism and fluid mechanics. (2) Chemical Engineering Fundamentals: Stoichiometry, industrial thermodynamics, theory on transport phenomena, chemical device/ quantity calculation of process/ design/ control etc. (3) Fundamentals of the Discipline: Fields related to the chemical fundamentals namely: organic chemistry, inorganic chemistry, physical chemistry, analytical chemistry, polymer chemistry, electrochemistry, photochemistry, interface chemistry, environmental chemistry
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-2 Highly Recommended Items for Mechanical Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Mechanical Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c)	Fundamental knowledge and abilities required for the students to grow toward the profile of engineers as established by each program
	(d)	Fundamental knowledge and ability to apply for problem-solving of fundamental subjects in mechanical engineering namely: materials and structure, dynamics and vibration, energy and fluid flow, information and measurement & control, design & manufacture / management

	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-3 Highly Recommended Items for Materials and Metallurgical Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Materials and Metallurgical Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	(1) Understanding fundamentals of material structure and characteristics, (2) Understanding fundamentals of process of materials, (3) Understanding fundamentals of function, design & utilization of materials, (4) An ability to plan & implement experiment and data analysis.
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-4 Highly Recommended Items for Resources and Geological Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Resources and Geological Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c)	(1) Applied mathematics (2) Natural sciences including, fundamentals of geoscience or geography/geology) (3) One of the areas in the discipline of resources and geological engineering as indicated below or specialized knowledge in the integration of those areas 1) Investigation on geosphere and disaster mitigation 2) Resource development and manufacturing

		3) Resource circulation and environment (4) An ability to search and solve problems by applying the applied mathematics/ natural sciences/ fundamentals of the discipline to the specific issue related to resources and geological engineering
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-5 Highly Recommended Items for Communication, Computer, Software, and similarly named Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Communication, Computer, Software, and similarly named Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c)	One of the below: (1) Engineering education programs related to electronics, information and communication: ・Knowledge of circuit theory, information theory, and communication theory, ・ An ability to apply including combination of the knowledge mentioned above (2) Engineering education programs related to computer, software, and information: ・Knowledge of logic circuit, information theory, and data structure ・An ability to apply including combination of the knowledge mentioned above
	(d)	・Knowledge of complex system of combination of engineering functions and concepts included in the learning outcomes of the program
	(e)	・An ability to plan and execute experiment of engineering functions and concepts included in the learning outcomes of the program and ability to acquire and analyze data accurately to examine from engineering perspective
	(f)	・An ability to accurately explain engineering functions and concepts included in the learning outcomes of the program to the others
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the

		curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		Certificating of qualification regarding education related to the discipline and select and commend performance on education

Appendix 1-3-6 Highly Recommended Items for Electrical, Electronic and similarly named Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Electrical, Electronic and similarly named Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	(1) Knowledge required to analyze and to design complex electrical / electronic devices or systems including hardware and software (2) An ability to plan and execute experiments to be complied with the learning outcomes of the program, to analyze data accurately, and to investigate from engineering perspective and to explain the results
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-7 Highly Recommended Items for Civil Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Civil Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	Knowledge of more than 3 areas from the following major areas of civil engineering: ・ civil engineering material & construction management, ・ structural engineering & earthquake engineering & maintenance management engineering, ・ geotechnique, ・ hydraulic engineering, ・ civil engineering planning & traffic engineering, ・ civil environmental system.
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the

		curriculum as defined in criterion 2.1 and 2.2" appropriate to the discipline.
		Faculty, including part-time staff, shall include professional engineers or certified engineers from the Japan Society of Civil Engineers, or members who have ability to teach subjects based on practical experience related to educational contents

Appendix 1-3-8 Highly Recommended Items for Agricultural Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Agricultural Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	One of the knowledge from: - irrigation, drainage and reclamation engineering, - agricultural planning, - agricultural mechanics, - post-harvest engineering, - agricultural meteorology, - bioenvironmental engineering, - agricultural structure, - agricultural informatics and eco-engineering, or systematic knowledge related to some of the above.
	Criterion 2.1(1)	The following shall be considered as "faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2" appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-9 Highly Recommended Items for Multi- and/or Trans-disciplinary Engineering, and New-disciplinary Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Multi- and/or Trans-disciplinary Engineering, and New-disciplinary Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	Specialized knowledge required by the discipline of Multi- and/or Trans-disciplinary Engineering, and New-disciplinary Engineering and ability to apply shall be defined by the higher education institutions applying for program evaluation

	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-10 Items to be Considered for Architecture and Building Engineering at Bachelor Level

Discipline	Major Related Criterion	Items to be Considered by Discipline
Architecture and Building Engineering	Criterion 1.2	The following, including benchmark, shall be considered as knowledge and abilities of the related disciplines based on given consideration on items to be considered related to the educational contents as defined in appendix 4-3-1 of Architectural and Architectural Engineering Education Programs at Bachelor and Master Level in addition to the appendix 1-2.
	(d)	The following items expected by “UNESCO/UIA Charter for Architectural Education”. (1) An ability to create architectural designs that satisfy both aesthetic and technical requirements (2) Adequate knowledge of the history and theories of architecture and the related arts, technologies and human sciences (3) Knowledge of the fine arts as an influence on the quality of architectural design (4) Adequate knowledge of urban design, planning and the skills involved in the planning process (5) Understanding of the relationship between people and buildings, and between buildings and their environment, and of the need to relate buildings and the spaces between them to human needs and scale (6) Understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors (7) Understanding of the methods of investigation and preparation of the brief for a design project (8) Understanding of the structural design, construction and engineering problems associated with building design (9) Adequate knowledge of physical problems and technologies and of the function of buildings so as to provide them with internal conditions of comfort and

		protection against the climate (10) Design skills necessary to meet building users' requirements within the constraints imposed by cost factors and building regulations (11) Adequate knowledge of the industries, organizations, regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning (12) Awareness of responsibilities toward human, social, cultural, urban, architectural, and environmental values, as well as architectural heritage (13) Adequate knowledge of the means of achieving ecologically responsible design and environmental conservation and rehabilitation (14) Development of a creative competence in building techniques, founded on a comprehensive understanding of the disciplines and construction methods related to architecture (15) Adequate knowledge of project financing, project management, cost control and methods of project delivery (16) Training in research techniques as an inherent part of architectural learning, for both students and teachers
	Criterion 2.3	The following shall be considered as "faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2" appropriate to the discipline.
		There are no additional items to be considered

Appendix 1-3-11 Highly Recommended Items for Engineering Physics and Applied Physics at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Engineering Physics and Applied Physics	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	Fundamental knowledge and ability for problem solving in at least one of emerging or applied areas of physics in broad sense in addition to mathematics, fundamental element of experiment in physics and ability to apply.
	Criterion 2.3	The following shall be considered as "faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2" appropriate to

		the discipline. There are no additional highly recommended Items.

Appendix 1-3-12 Highly Recommended Items for Industrial Engineering and Management at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Industrial Engineering and Management	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c)	Fundamental knowledge of related disciplines namely, mathematics, management, economics and ability to utilize and apply fundamental knowledge of transdisciplinary specialized technology and information technology such as computer.
	(d)	(1) Knowledge and ability to utilize principles and methods related to management. (2) Mathematical analytic ability. The ability includes ability to plan systematic data collection while analyzing data by considering probability variation and ability to find most optimal solution to simulate actual problems by applying mathematical formula.
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		Faculty includes members who have ability to teach practice related to industrial engineering and management and its related disciplines

Appendix 1-3-13 Highly Recommended Items for Agricultural Science and Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Agricultural Science and Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c)	Theoretical and applicable knowledge of biological science, bioenvironmental science, biological production science and biological resources science.

	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		Faculty, including part time staff, shall include either individuals who have qualification such as license of professional engineer or individuals who are eligible to teach subjects through practical experience relating to the field.

Appendix 1-3-14 Highly Recommended Items for Forest Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Forest Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c), (d)	One of general fundamentals and specialized areas namely, forestry, forest engineering, natural environment, forest product related to forest ecosystem, forest environment, conservation of natural environment, sustainable production and utilization of forest resources and of the field of engineering such as forestry, forest engineering, natural environment, forest product, or combination of those areas.
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 1-3-15 Highly Recommended Items for Environmental Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Environmental Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c)	Knowledge of more than two disciplines from physics, chemistry, biology and geology.
	(d)	One of the following areas related to environment or include fundamental knowledge of combination of these areas: (1) Area related to urban environment and environmental system

		(2) Area related to infrastructure and its environment (3) Area related to residency and living environment (4) Area related to environment of materials and energy
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		Faculty, including part-time staff, shall include either members who is professional engineer or members who have ability to teach subjects based on practical experience related to educational contents.

Appendix 1-3-16 Highly Recommended Items for Biochemical, Biological and Biophysical Engineering at Bachelor Level

Discipline	Major Related Criterion	Highly Recommended Items by Discipline
Biochemical, Biological and Biophysical Engineering	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(c)	Mathematical knowledge related to biological engineering and information processing technology
	(d)	More than two major areas from biological engineering namely, biology, biological information, biochemical, cell engineering, bionics, biochemical engineering and environmental bioengineering or knowledge able to acquire by achieving combination of those areas and ability to apply the knowledge to problem solving from engineering perspective namely: (1) Specialized knowledge and technologies (2) An ability to plan and conduct experiment, to analyze and investigate acquired data accurately (3) An ability to understand practical issues which engineers in biological engineering experience and ability to confront those issues appropriately
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional highly recommended Items.

Appendix 2-1 Requirements for Engineering Education Programs at Master Level

Related Criterion	Requirements for Engineering Master Category
Criterion 2.1	There are no additional requirements to the Common Criteria.

Appendix 2-2 Highly Recommended Items for Engineering Education Programs at Master Level

Related Items of Criterion	Highly Recommended Items for Engineering Master Category
Criterion 1.2(a)~(i)	Advanced learning outcomes of the program shall be established compared to the engineering education program at bachelor level to the highly recommended items.

Appendix 3-1 Requirements for Computing & IT-related Education Programs at Bachelor Level

Related Criterion	Requirements for Computing & IT-related Category
Criterion 2.1	There are no additional requirements to the Common Criteria.

Appendix 3-2 Highly recommended items for Computing & IT-related Education Programs at Bachelor Level

Related Criterion	Highly Recommended Items for Computing & IT-related Bachelor Category
Criterion 1.2(a)	The learning outcomes in terms of “(a) An ability of multi-dimensional thinking with knowledge from global perspective” shall be established by giving consideration on the following items.
	・Knowledge of diverse culture and society of mankind as well as nature ・An ability to take appropriate actions based on the knowledge mentioned above
Criterion 1.2(b)	The learning outcomes in terms of “(b) An ability of understanding of effects and impacts to the society and to the nature of professional activities, and understanding of professionals’ social contributions and responsibilities” shall be established by giving consideration on the following items.
	・ Understanding of impact of technology of related Computing & IT-related disciplines on public welfare ・ Understanding of implication of technology of related Computing & IT-related disciplines on environmental safety and sustainable development of society ・ Understanding of IT professionals ethics ・ Understanding on information security ・ An ability to take actions based on the understanding mentioned above
Criterion1.2(c)	The learning outcomes in terms of “(c) Knowledge of mathematics, natural science and information technology, and ability to apply” shall be established by giving consideration on the following items.
	・ Knowledge of required mathematics, including discrete mathematics, probability and statistics, and natural sciences ・ An ability to apply the knowledge mentioned above including the combination of the knowledge
Criterion 1.2(d)	The learning outcomes in terms of “(d) Knowledge of the related professional fields, and ability to apply” shall be established by giving consideration on the following items.

	・ Specialized knowledge required in the related computing & IT-related disciplines ・ An ability to apply the knowledge mentioned above including the combination of the knowledge ・ An ability to utilize hardware and software required in the related computing & IT-related disciplines ・ An ability to select, create and apply appropriate techniques and tools to complex computing activities ・ An ability to apply fundamental knowledge related to the information security
Criterion 1.2(e)	The learning outcomes in terms of “(e) Design ability to meet the requirements of the society by utilizing various sciences, technologies and information” shall be established by giving consideration on the following items.
	・ An ability to recognize problems to be solved ・ An ability to specify constraints from public welfare, environmental safety, and economy to be taken in account ・ An ability to analyze and model problems, and identify and define the information processing requirements required for its solution ・ An ability to design, implement and evaluate a computer-based system, process, component, or program under various constraints to satisfy given requirements
Criterion 1.2(f)	The learning outcomes in terms of “(f) Communication skills including logical writing, presentation and debating” shall be established by giving consideration on the following items.
	・ An ability to deliver information and opinions to others ・ An ability to understand information and opinions delivered by others ・ An ability to exchange information and opinions by utilizing foreign languages such as English
Criterion 1.2(g)	The learning outcomes in terms of “(g) An ability of learning independently and continuously” shall be established by giving consideration on the following items.
	・ Understanding of necessity of continuous professional development for a life-long computing & IT-related professionals ・ An ability to acquire necessary information and knowledge

Criterion 1.2(h)	The learning outcomes in terms of “(h) An ability to manage and accomplish tasks in a planned way under given constraints” shall be established by giving consideration on the following items.
	・ An ability to accomplish tasks as planned systematically under given constraints including time and cost ・ An ability to understand the progress of the plan and modify as required
Criterion 1.2(i)	The learning outcomes in terms of “(i) An ability to work in a team” shall be established by giving consideration on the following items.
	・ An ability to precisely determine own work and carry out during collaborative work ・ An ability to appropriately determine what others should do and to encourage the involvement of others during collaborative work

Appendix 3-3-1 Highly Recommended Items for Computer Science at Bachelor Level

Discipline	Related Criterion	Highly Recommended Items by Discipline
Computer Science	Criterion1.2	One of the following J17-CS, J07-CS stipulated by Information Processing Society of Japan, CS2013, CS2008, CS2001 stipulated by IEEE-CS and ACM of United States shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 3-2.
	(c)	・ Mathematical knowledge required for Computer science and an ability to apply
	(d)	・ An ability to apply algorism and computational effort, concepts of programing language and computer science theories to the modelization and design by computer-based systems ・ An ability to apply principles of design and development to the construction of software systems with various complexity ・ More than three knowledge related to the items below: ➢ Computer architecture, ➢ Information management, ➢ Network and communication, ➢ Parallel distributed processing, ➢ Intelligent system ・ Comprehensive knowledge of more than one programing language and an ability to utilize.
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		・ Faculty shall include full-time members, who have a Ph.D. in computer science or neighboring disciplines. ・ Faculty shall include sufficient numbers of full-time members, who have experience in providing information processing system made to be used by the third party.

Appendix 3-3-2 Highly Recommended Items for Information Systems at Bachelor Level

Discipline	Related Criterion	Highly Recommended Items by Discipline
Information Systems	Criterion1.2	One of the following J17-IS, J07-IS stipulated by Information Processing Society of Japan, IS2010, IS2002 stipulated by AIS and ACM of United States shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 3-2.
	(d)	・ An ability to understand the processes of planning, designing, building, operating and evaluating information systems relating to the activities of organizations and society, and an ability to solve given problems taking account of the cost - benefit efficiency ・ Knowledge related to quantitative and qualitative date collection and analysis
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		・ Faculty shall include full-time members, who have a degree higher than Master Degree in information systems or related disciplines ・ Faculty shall include full-time members, who have experience of leading successful information system development projects for his/her organization (governmental or corporate) or information system development projects for customers.

Appendix 3-3-3 Highly recommended Items for Information Technology at Bachelor Level

Discipline	Related Criterion	Highly Recommended Items by Discipline
(Information Technology / Cyber Security)	Criterion1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 3-2.
	(d)	One of the following: (1) One of the following J17-IT, J07-IT stipulated by Information Processing Society of Japan, IT2017, IT2008, IT2005 stipulated by IEEE-CS and ACM of United States shall be considered as knowledge and abilities related to Information Technology. ・ An ability to analyze user needs and ability to structure, operate and manage information systems ・ Knowledge related to user interface as fundamental of information technology, information management, programing, web system technology and network. (2) knowledge and abilities related to the cyber security ・ An ability to apply principles and practice of security to the environment, hardware, software and human side of the system ・ An ability to analyze and evaluate for the system operation by recognizing existing risks and threats ・ Knowledge and ability to holistically apply confidentiality, completeness, availability and concept of adversary ・ Fundamental knowledge of data security, software security, system security, human security, organizational security and social security
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		・ Faculty shall include full-time members, who have experience of leading successful information system development projects for his/her organization (governmental or corporate) or information system development projects for customers or

		members or, who have experience of taking leading position including project management in the management / operation by taking consideration on security.

Appendix 3-3-4 Highly recommended Items for Computing General at Bachelor Level

Discipline	Related Criterion	Highly Recommended Items by Discipline
Computing General	Criterion1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 1-2.
	(d)	(1) Knowledge and ability to apply specific domain of information science and technology targeted by the education program.
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		・Faculty shall include sufficient numbers of full-time members, who have experience in development of information system made to be used by the third party.

Appendix 4-1 Requirement for Architectural and Architectural Engineering Education Programs at Bachelor and Master Level

Related Criterion	Requirement for Architectural and Architectural Engineering Category
Criterion 2.1	The curriculum of Architectural and Architectural Engineering Education Programs at Bachelor and Master Level shall include master design, master thesis, or equivalent research assignment.

Appendix 4-2 Items to be Considered for Architectural and Architectural Engineering Education Programs at Bachelor and Master Level

Related Criterion	Items to be Considered for Architectural and Architectural Engineering Category
Criterion 1.2	The following shall be considered related to each items in Criterion 1 (2) for the Architectural and Architectural Engineering Education Programs at Bachelor and Master Level.
	The programs at Bachelor Level shall be in accordance with Appendix 1-2 of the Engineering Education Programs at Bachelor Level. The programs at Master Level, the following items shall be considered and all of the term “professional activities” mentioned in common criteria and Category-dependent Criteria shall be read “architectural design and architectural engineering” and “professional” as “architectural designer and architectural engineer”.
Criterion 1.2(a)	The learning outcomes in terms of “(a) An ability of multi-dimensional thinking with knowledge from global perspective” shall be established by giving consideration on the following items.
	・Knowledge of diverse culture and society of mankind as well as nature ・An ability to take appropriate actions based on the knowledge mentioned above
Criterion 1.2(b)	The learning outcomes in terms of “(b) An ability of understanding of effects and impacts to the society and to the nature of professional activities, and understanding of professionals’ social contributions and responsibilities” shall be established by giving consideration on the following items.
	・Understanding of impact of technology of discipline of architectural design and architectural engineering on public welfare ・Understanding of implication of technology of discipline of architectural design and architectural engineering on environmental safety and sustainable development of society ・Understanding of architect and architectural engineers’ ethics ・An ability to take actions based on the understanding mentioned above
Criterion1.2(c)	The learning outcomes in terms of “(c) Knowledge of mathematics, natural science and information technology, and ability to apply” shall be established by giving consideration on the following items.
	・Knowledge of mathematics and natural sciences required in the discipline of architectural design and architectural engineering

	・An ability to apply the knowledge mentioned above including the combination of the knowledge
Criterion1.2(d)	The learning outcomes in terms of “(d) Knowledge of the related professional fields, and ability to apply” shall be established by giving consideration on the following items.
	・Specialized knowledge required in the architectural design and architectural engineering discipline ・An ability to apply the knowledge mentioned above including the combination of the knowledge ・An ability to utilize hardware and software required in the architectural design and architectural engineering discipline
Criterion 1.2(e)	The learning outcomes in terms of “(e) Design ability to meet the requirements of the society by utilizing various sciences, technologies and information” shall be established by giving consideration on the following items.
	・An ability to recognize problems to be solved ・An ability to specify constraints from public welfare, environmental safety, and economy to be taken in account ・An ability to logically specify, organize and analyze problems ・An ability to prepare detailed plans toward problem-solving by taking account of various constraints and applying systematic knowledge of mathematics, natural sciences and technology in the architectural design and architectural engineering discipline ・An ability to solve problems and design architecture in accordance with the plan
Criterion 1.2(f)	The learning outcomes in terms of “(f) Communication skills including logical writing, presentation and debating” shall be established by giving consideration on the following items.
	・An ability to deliver information, opinions and proposal to others ・An ability to understand information and opinions delivered by others ・An ability to exchange information, opinions, proposal by utilizing foreign languages such as English
Criterion 1.2(g)	The learning outcomes in terms of “(g) An ability of learning independently and continuously” shall be established by giving consideration on the following items.
	・Understanding of necessity of continuous professional development for a life-long architect or architectural engineer ・An ability to acquire necessary information and knowledge
Criterion1.2(h)	The learning outcomes in terms of “(h) An ability to manage and accomplish tasks in a planned way under given constraints” shall be established by giving consideration on the following items.
	・ An ability to accomplish tasks as planned systematically under given constraints including time and cost ・ An ability to understand the progress of the plan and modify as required

Criterion 1.2(i)	The learning outcomes in terms of “(i) An ability to work in a team” shall be established by giving consideration on the following items. ・ An ability to precisely determine own work and carry out during collaborative work ・ An ability to appropriately determine what others should do and to encourage the involvement of others during collaborative work

Appendix 4-3-1 Items to be Considered for Architectural and Architectural Engineering Education Programs at Bachelor and Master Level

Discipline	Related Criterion	Items to be Considered by Discipline
Architectural Design and Planning	Criterion 1.2	The following shall be considered as knowledge and abilities of the related disciplines in addition to the appendix 4-2.
	(d)	Following items as expected by “UNESCO/UIA Charter for Architectural Education” (1) An ability to create architectural designs that satisfy both aesthetic and technical requirements (2) Adequate knowledge of the history and theories of architecture and the related arts, technologies and human sciences (3) Knowledge of the fine arts as an influence on the quality of architectural design (4) Adequate knowledge of urban design, planning and the skills involved in the planning process (5) Understanding of the relationship between people and buildings, and between buildings and their environment, and of the need to relate buildings and the spaces between them to human needs and scale (6) Understanding of the profession of architecture and the role of the architect in society, in particular in preparing briefs that take account of social factors (7) Understanding of the methods of investigation and preparation of the brief for a design project (8) Understanding of the structural design, construction and engineering problems associated with building design (9) Adequate knowledge of physical problems and technologies and of the function of buildings so as to provide them with internal conditions of comfort and protection against the climate (10) Design skills necessary to meet building users’ requirements within the constraints imposed by cost factors and building regulations (11) Adequate knowledge of the industries, organizations, regulations and procedures involved in translating design concepts into buildings and integrating plans into overall planning (12) Awareness of responsibilities toward human, social, cultural, urban, architectural, and environmental values, as well as architectural heritage (13) Adequate knowledge of the means of achieving

		ecologically responsible design and environmental conservation and rehabilitation (14) Development of a creative competence in building techniques, founded on a comprehensive understanding of the disciplines and construction methods related to architecture (15) Adequate knowledge of project financing, project management, cost control and methods of project delivery (16) Training in research techniques as an inherent part of architectural learning, for both students and teachers
	Criterion 2.1	The following shall be considered as “educational components of mathematics, natural sciences and technologies” appropriate to the field.
		Architectural and Architectural Engineering Education Programs at Bachelor Level shall establish course to satisfy requirements of related qualification for taking “class-1 architects” examination as national license of practice. As for the programs at master level, program shall establish internship and its related courses as equivalent as at least one year experience of professional practice which is accredited based on the regulation no. 1033, paragraph 1 and 2 notified by Ministry of Land, Infrastructure, Transport and Tourism as required experience of professional practice to take examination of “class-1 architects”.
	Criterion 2.3	The following shall be considered as “faculty and support system to appropriately implement education based on the curriculum as defined in criterion 2.1 and 2.2” appropriate to the discipline.
		There are no additional Items to be considered.