

II. Education Program

1. Diploma and Curriculum Policies

1.1. Diploma Policy

A student who completes this program can take one of the following degrees, “Doctor of Engineering”, “Doctor of Science”, or “Doctor of Philosophy”. In any of these cases, the term “completed Advanced Graduate Program in Global Strategy for Green Asia” is added.

Diploma policies of this program are shown as follows.

- (1) Degrees are granted to those who have been enrolled in the course for the stipulated period, who have undertaken education and research activities aligned with curricula that are based on the course’s principles and goals, and who have fulfilled all the following conditions within the stipulated length of time.

Condition 1: Have successfully passed all doctoral thesis screenings and examinations

Condition 2: Have taken courses on developing the abilities of research, practice, global perspective and system landscape, and have obtained the requisite number of credits for each course.

- (2) In addition to the research ability based on advanced, specialized knowledge, the standard for course completion is based on whether students have been able to combine the aforementioned abilities of research, practice, global perspective and system landscape, as well as master the abilities and knowledge needed to contribute to the industrial, economic, and social development of Japan and other Asian countries as international leaders in industry, academia, and government.
- (3) Other aspects considered when evaluating course completion include whether students’ research in the later stages of the program is conducted with a sophisticated sense of morality and a firm sense of responsibility in accordance with the principles of Green Asia, and whether those submitting doctoral theses have the ability to explain concepts logically.
- (4) Those deemed to have acquired superlative skills and research results during the course of their studies are eligible to complete the course as much as half a year early

1.2. Curriculum Policy

The course and research works to acquire the abilities of research, practice, global perspective, system landscape, and leadership are shown in **Table 2-1**, which should be equipped to complete Green Asia Program (**Figure 2-1**). As will hereinafter be described in detail.

This degree program is a 5-year integrated doctoral program. For course students to develop the abilities of research, system landscape, global perspective, practice, and leadership to drive the Green Asia Strategy, the program has been designed so that they obtain a well-rounded balance of all these qualities, and simultaneously can demonstrate their personal growth to others. This program operates on the assumption of fall enrollment (initial entry), in line with the international standard. Students who enroll in a master’s program in April can take a 6-month pre-program and a 4.5 year actual program (0.5 years × 9 stages gates), totaling to 5 years (**Figure 2-2**). On the other hand,

students who enroll in the fall become regular program students with a total program duration of 5 years. This system, therefore, enables international students unfamiliar with Japan's research environment to have sufficient preparation and time to undertake doctoral research. Students who enroll in Master's program in April acquire basic academic abilities during the pre-program and are then tested through the entrance examination.

Table 2-1. Ways and classes to acquire five abilities

Ability	Way to acquire	Class
Research	(1) Research activity in three laboratories in different areas; (2) Acquisition of high levels of specialized knowledge through advanced researches; (3) Taking Special Classes from more than one department	(1) Fundamental Research (laboratory rotation); (2) Doctoral Researches under the stage gate system; (3) Special Classes
Practical Understanding	(1) Practical activities in research and development workplaces in Japan and overseas; (2) Classes by invited individuals associated with a company	(1) Practice School, and Domestic and International Internships; (2) Industrial Systems
Global Perspective	(1) Practice in expression, discussion, and description in English; (2) Acquisition of economics and sociological knowledge	(1) Two types of International Exercises (A and B); (2) Social, Environmental, and Economic Systems
System Landscape	(1) Learning economics, sociology, and environmentology; (2) Consilience of arts and sciences	(1) Social, Environmental, and Economic Systems; (2) International Exercise A (Green Asia Forum) and a free article
Leadership	(1) Acting as a leader in International Exercises; (2) Practice with lead researchers and/or developers in Japan and overseas; (3) Exercise for research guidance to younger students	(1) Two types of International Exercises (A and B); (2) Practice School, and Domestic and International Internships; (3) Research Guidance Exercises

(a) Admission

Students enrolled in this program undertake a course of education based on a standard of either 4.5 years (0.5 years × 9 stage gates) or 5 years (0.5 years × 10 stage gates). For those enrolled in a master's course at a Japanese university, including this university, the 6 months prior to the entrance examination constitute a period during which students can develop the requisite abilities to pass the program's entrance examination. They also provide a period during which those hesitant to commit to 5 years of study at graduate school can carefully consider whether enrollment is the correct path for them. While the entrance examination is based on traditional master's course entrance examinations, the introduction of the following 5 items ensures the quality of students selected for the program: (1) Students are required to submit multiple letters of recommendation from teachers and others who have taught the candidate in the past. (2) Those who recommended the candidates will be interviewed. (3) Written and oral examinations are administered in English. (4) In the written examination, candidates are tested on their logical thinking, English skills and descriptive abilities through a small writing assignment; they also take a science and technology examination in their specialty area, with an increased difficulty level relative to traditional master's program entrance

examinations. (5) Students are required to submit their grades from undergraduate study. Successful candidates are also given the option of transferring some of the credits obtained through prior graduate-level study to meet requirements specified by this program. This is an effective way of increasing the number of candidates from outside this university and recruiting outstanding students.

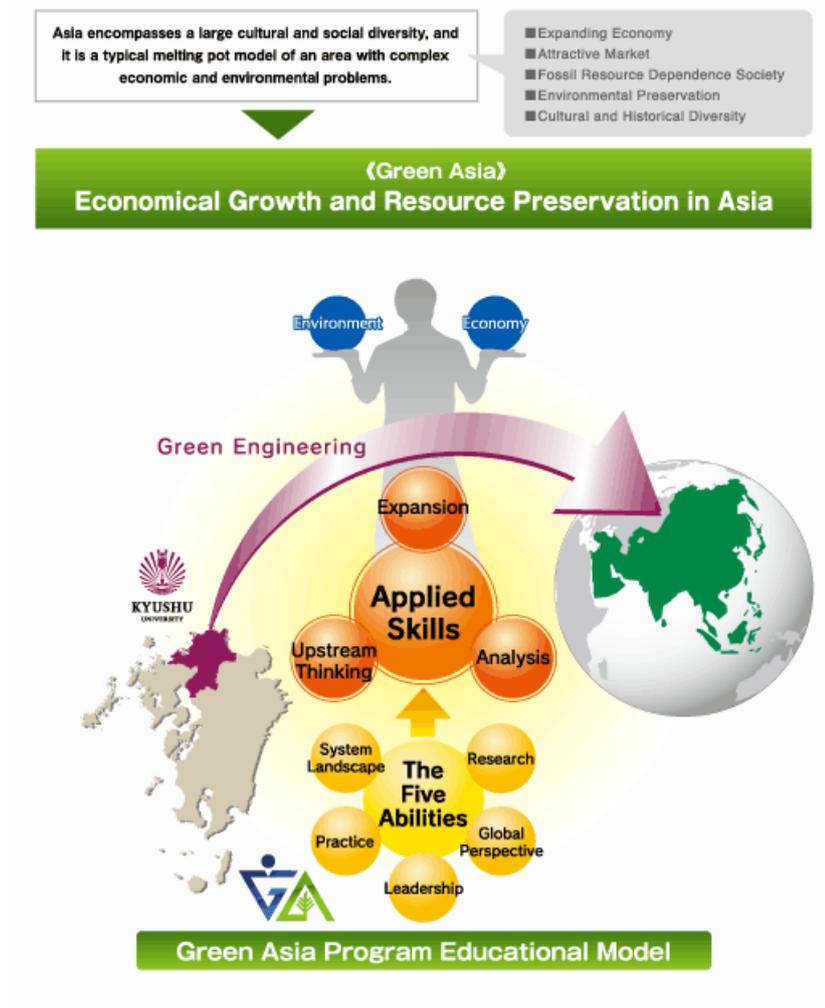


Figure 2-1. Green Asia Program Education Model

(b) Master’s Course: Cultivation of Fundamentals of Five Abilities in Organized Course Works

In addition to majoring in either System Engineering, Material Science, or Resources Engineering and taking subjects (majors) in one of these fields, students in this course are required also to take two extended specialty courses in fields besides their major fields. By doing so, they develop the abilities of research and system landscape. Environmental Studies, Sociology/Economics, Industrial Practice, and Practical English are all essential for giving students a firm grounding in the abilities of system landscape, global perspective, and practice.

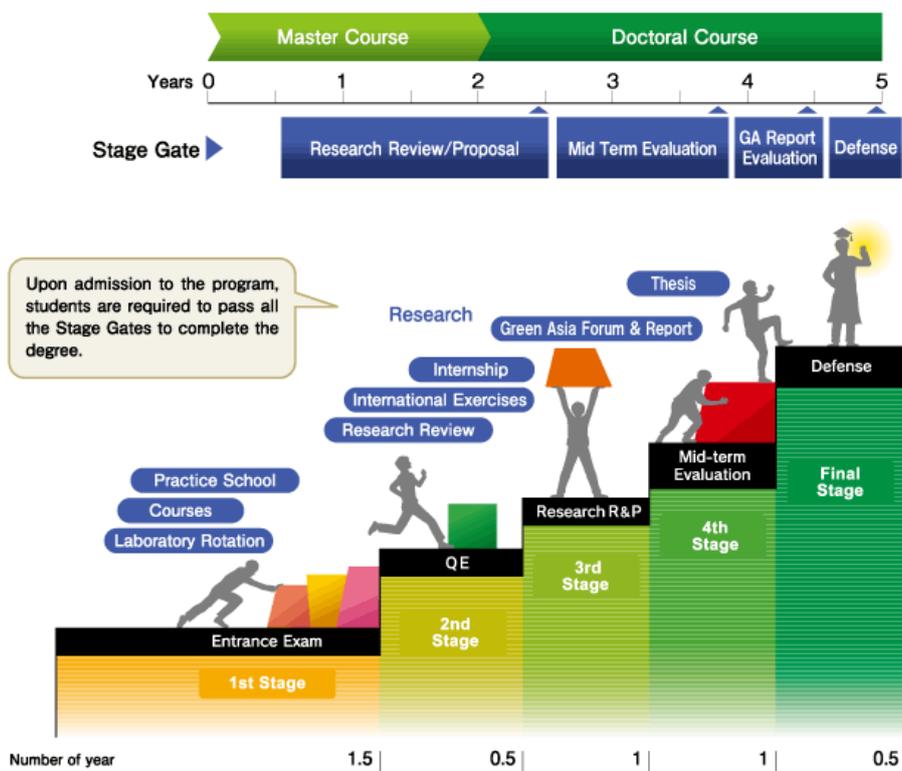


Figure 2-2. Stage Gates

In Practice School, emphasis is placed on developing practical skills and leadership ability. Students spend a month identifying issues of interest under the instruction of the mentoring care unit (MCU) and spend the following 2 months participating in a business internship or industry–academia joint research project with the goal of solving their issues in association with a leader (technical mentor) through research and development at a company. The laboratory rotation system applies to the first through the third stages gates of research activities. Here, each student conducts approximately 3 months of Fundamental Research at 3 different laboratories. Students are encouraged to choose laboratories at 2 or more faculties as long as this does not hinder their studies. In contrast to traditional master’s thesis research, this arrangement provides research guidance with an emphasis on acquiring research methodologies from different fields.

(c) 1st Stage Gate: Qualifying Examination

Students sit for the qualifying examination (QE) at the end of the third stage gate. Only those who have met all the requirements relating to their subject grades thus far are eligible to sit for this examination. During the QE, students give an oral presentation and answer questions in English on what they have learned from (1) the subjects they have taken and (2) their research in multiple majors, along with (3) their practical activities in Practice School. In the written examination, students are tested on their abilities relating to their specialty area and their understanding of the nature of science and technology through a short essay in English. Grades for the QE are determined through evaluations of these examinations and reports by the student’s MCU (a mentor and a

technical mentor). Only those who receive a grade of “Pass” on the QE can progress to the fourth stage gate.

(d) 2nd Stage Gate: Research Review and Proposal

In the fourth stage gate, students commence work on their doctoral research under the guidance of an advisor who is not their MCU mentor. Here, students prepare comprehensive and exhaustive review papers, write a research proposal based on these review essays, and undergo a screening at the end of the period. Screening is conducted to gauge whether these proposals and reviews are of suitable quality and originality to support cutting-edge research. While those who pass the screening stage acquire credits for Doctoral Research (I), only those who have achieved the requisite number of credits, overall GPA, and GPA in individual competency areas through the fourth period are permitted to proceed to the fifth and sixth stage gates.

(e) 3rd Stage Gate: Interim Report

At the end of the sixth stage gate, students submit an Interim Report and undergo screening. During screening, students are given scores out of a possible 10 points on individual items, with the main criteria consisting of (1) originality, (2) scientific significance, (3) significance from the perspective of Green Engineering, and (4) technical qualities of the report. Only those who have passed this screening stage (with at least 80 of 100 points) and have achieved the requisite number of credits, overall GPA, and GPA in individual competency areas are permitted to proceed to the seventh period.

(f) 4th Stage Gate: Green Asia Article

In International Exercise A: “Green Asia Forum,” held during the fifth through ninth stage gates, students combine the knowledge that they have developed through debates and discussions on science, technology, and industrial structures for achieving Green Asia, as well as on industrial cooperation in Asia and on the nature of societies and economies, with their own specialist knowledge. Using all this knowledge, in the eighth stage gate, students write a paper on a topic of their own choosing. These papers are screened by members of the teaching staff in the social sciences field in charge of International Exercise A, along with the program coordinators and a small number of external experts. During this screening, students are given scores out of a possible 10 points on individual items, with the main criteria consisting of (1) whether the paper presents a proposal that has the potential to contribute to the simultaneous development of greening and economic growth, (2) whether it integrates knowledge of the environment, society, and economics with specialist knowledge, and (3) whether it presents a multifaceted consideration of science, technology, and industrial collaboration in Asia.

(g) 5th Stage Gate: Doctor Thesis and Final Qualifying Examination

At the end of the ninth stage gate, doctoral thesis screenings are conducted, and these form the final requirement for the conferral of degrees. Here, in addition to a doctoral thesis screening from the perspective of whether the student has acquired the requisite expertise to earn a degree, students

are also screened using the same criteria as the third stage gate as a Final QE. This includes the addition of one or more international researchers who are active overseas as a referee and the requirement for students to have had the research achievements contained in their doctoral thesis published or accepted for publication in an academic journal with an impact factor over a specified value. In addition to passing these screenings, eligibility for degree conferral through this program requires completion of 77 or more credits, a total GPA of 2.31 or more, and GPA totals for individual competency areas that are above the specified values. These requirements are designed to assure that graduates possess research skills, multifaceted perspectives, international competencies, practical skills, and overall ability at or in excess of the level specified thereby ensuring the degree conferral according to the admission policy. One of the characteristics of this program is that, while students accumulate credits and grades in various subjects, their process of acquiring and integrating skills can also be apparent, both by the students and others, through their coursework and research as a result of the many submissions and achievements completed over the duration of the program.

The practice subjects characterizing this program are summarized as follows.

(h) International Exercise A

In the aforementioned Green Asia Forum, a member of the teaching staff in the social sciences assumes overall leadership and holds lectures (including guest lecturers) and seminars or panel discussions on issues related to the principles of Green Asia on a monthly basis. Through participation in these forums, students come up with their own research topics (in science and technology or social/industrial studies) and conduct research while receiving support from the overall leader and their MCU. In International Exercise A4, in addition to presenting their own research, students take charge of a seminar on their topic and guide the discussion, creating a Green Asia paper based on the results of this seminar, and thereby fulfilling a requirement of the fourth stage gate. Papers that pass the screening stage are published in the program's journal, "EVERGREEN." Another goal is for teaching staff in the social sciences and students to publish papers in journals under joint authorship.

(i) International Exercise B

This program holds the Global Strategy for Green Asia Conference once a year and organizes the Green Asia Symposium, which presents progress reports for the program, stages lectures by Asia's business and academic leaders, and merges insights from the social sciences, scientific technology, and industrial technology. In addition to presenting their own research, students play specific roles as participants in the planning and implementation of this conference. Through International Internships, researchers and technicians from core overseas partners and other collaborating bodies act as hosts and provide accepted students with practical guidance on their research and development activity. Hosts act as overseas mentors, continuing to provide students with guidance as members of MCU. The duration of this is 1 month for identifying specific topics, meetings, and 2 months of on-site activities.

(j) Domestic and Overseas Internship Program

By participations in this internship program the students will gain valuable work experience in industrial and/or research institutes throughout Japan and in key overseas locations, thus fostering their practical and internship abilities. The various activities will be organized as a sequence of practical schools lasting form 1 to 2 months, overseas internship lasting from 2 to 3 months, finally a short domestic internship of duration 2 to 3 weeks. During the practical school, each student will be free to choose from a range of organizations and potential technical mentors, and then make detailed plans regarding the execution of the project under the guidance of their chosen mentors. After approximately 2 years, the student will have the opportunity to acquire a second period of work experience with the same host organization and technical mentors as chosen previously.

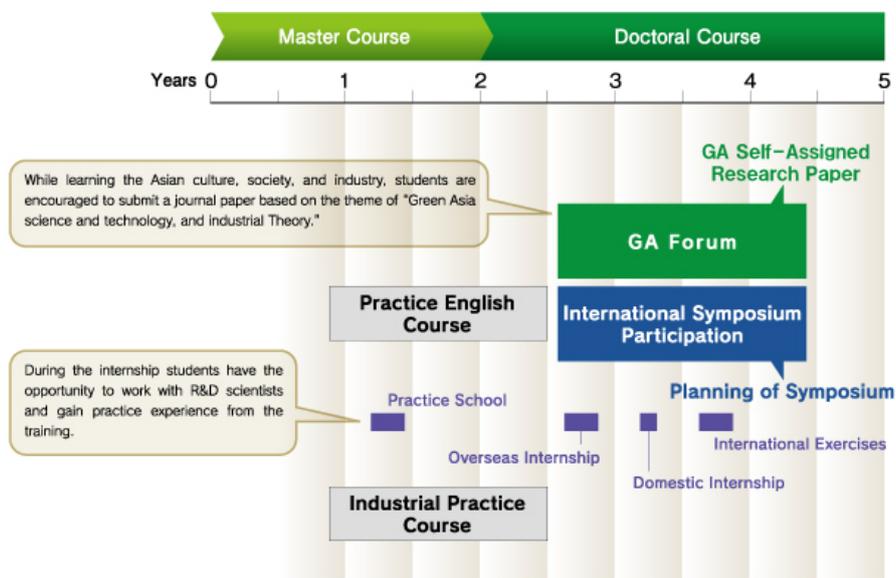


Figure 2-3. Internship Program

(k) Administrative Leadership

This program is designed to enable students to develop an ability to have a strong initiative, a quality essential to leadership in all specialties. In the Practice School and International Internship, students tackle relevant tasks alongside leaders in research and development. These leaders are involved in the MCU as technical mentors and overseas mentors, and they provide students with guidance along the way. During the first through fifth stage gates of Industrial Systems, students study theories of leadership under industry leaders. In International Exercise B, students participate in the planning and implementation of the Global Strategy for Green Asia Conference, which is held once a year. In particular, during the ninth stage gate students assume a leadership role in planning and directing this event as part of an organizing committee. During the final stage of International Exercise A (the eighth stage gate), the students act as seminar moderators, inviting lecturers and establishing topics for discussion and debate. Research Guidance Exercises are held during the seventh and eighth stage gates. Here students assume partial responsibility for providing research

guidance to master's program students who are under the guidance of their doctoral research advisors, thus giving them experience in providing instruction to others in their specialty area.

(I) Mentoring and Support System for Students: Mentoring Care Unit

A mentoring care unit (MCU), comprising a world-class senior researcher (mentor: program leader), a junior researcher (tutor: program assistant), an overseas mentor (advisor on the International Internship) and a technical mentor (supervisor in the Practice School), guides and supports each student consistently. The technical and overseas mentors join the MCU in picking a theme for Practice School and guiding the student's progress through the doctoral course of study, respectively. The mentor submits bimonthly and end-of-the-semester reports on the development of his or her student's capabilities to the Academic Affairs Committee of the Green Asia Education Center. A professor cannot act as both a mentor and a chief referee of one student. With such support individual areas of specialization, students can acquire a breadth of knowledge that leads to the development of system landscape ability.

Master's students attend a serious internship, Practice School, in domestic companies or institutes (domestic partner organizations), to gain experiences in research developments under the guidance of the technical mentors. As the students may have heavy workload in Practice School, mentors conduct interviews with their students and the technical mentors, and provide the necessary support. In their International Internship, the students are supported through partnerships between mentors and overseas mentors, and between the Green Asia Education Center and the administrative office of the Program for Leading Graduate Schools.

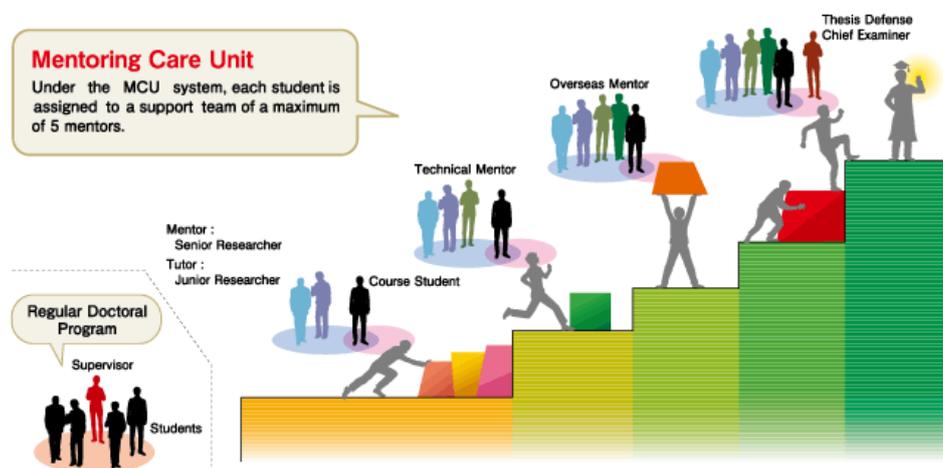


Figure 2-4. Mentoring Care Unit

2. Admission Policy and Results

2.1. Admission Policy

In this program, which aims to develop doctoral degree holders with a global perspective that transcends national borders and is based on the fields of resource engineering, material science, system engineering, and environmentology, the goal of course entrance examinations is to select