

# I. Principles, Organization, and Management System of “Green Asia Program”

## 1. Features and Principles

### 1.1. Candidate Cultivation

The Green Asia Program aims to develop exceptional leaders who can contribute to the achievement of “Green Asia”. Successful candidates have the opportunity to be trained in one of the program’s three specialized fields: materials science, system engineering, and resources engineering, with additional lectures on environmental science, basic sociology, and economics. Furthermore, candidates can network with other professionals in Asia through educational training offered domestically and abroad. Candidates who have completed all the required training can assume the leading role in the field with the five abilities of research, practical understanding, global perspective, objective appraisal, and leadership.

### 1.2. Program Features

1. Education system development:

Accepting a wide range of domestic and international students, the program provides interdisciplinary graduate education in addition to promoting reform in the educational system.

2. Curriculum:

Apart from the science and engineering studies (including international and industrial internships and international exercises), humanities and other social-science subjects are included in the curriculum (Green Asia research paper) (**Figure 1-1**).

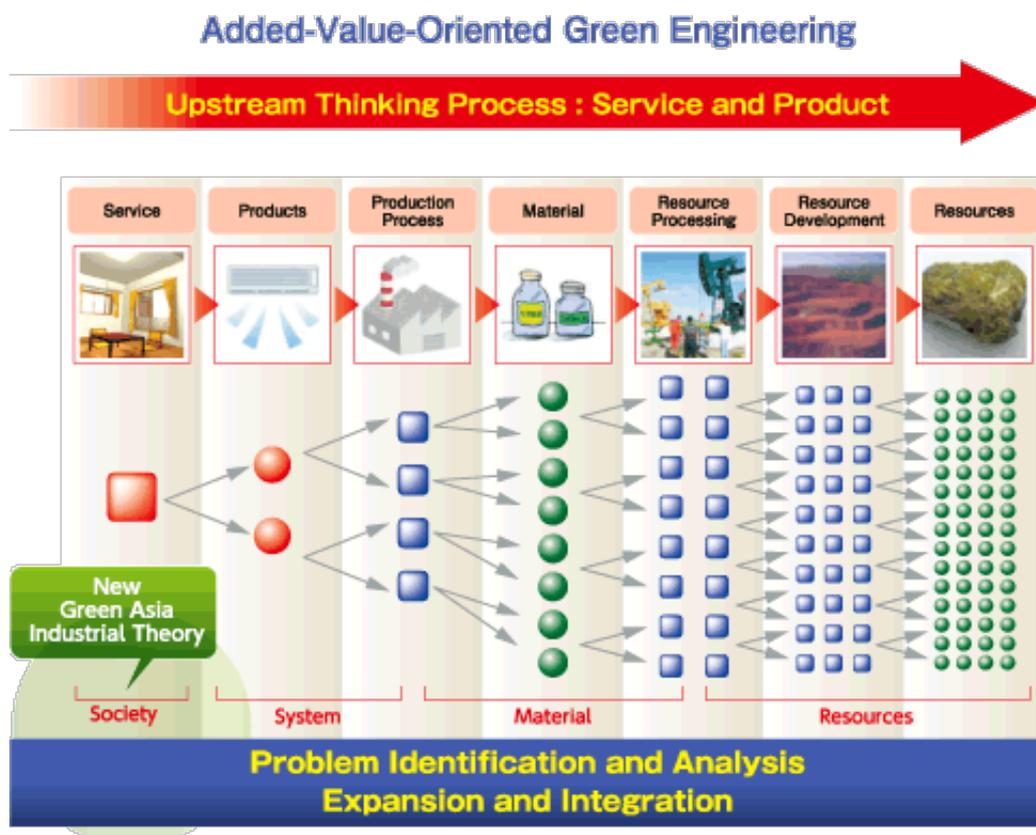
3. Mentoring care unit (MCU):

The program also contains an evolutionary mentoring care unit.



Figure 1-1. Educational system and curriculum in the Green Asia Program.

4. Asia collaboration network and government-industry-academia partnerships:  
The program connects more than 30 research institutions across Asia and works with 58 organizations within Japan to construct an industrial system in Green Asia through the application of both humanities and sciences.
5. Education quality assurance and external assessment:  
The program prepares educational results and guidance portfolio for each student.
6. Added-value-oriented green engineering:  
The program trains individuals to acquire the abilities of upstream thinking, problem analysis, and expansion to accomplish the goal of Green Asia (**Figure 1-2**).
7. Establishment of the Green Asia Education Center



**Figure 1-2.** From current technology to added-value-oriented green engineering.

### 1.3. Basic Principles

The “Program for Leading Graduate Schools” seeks to recruit talented individuals with traits of creativity and foresight who can play an active role in government, industry, and academia on a global scale. The program offers the highest quality of education available in the field and trains students to work across a wide spectrum of platforms. With this approach, the government is supporting a radical reformation of graduate school system in Japan and promoting the formation of future-oriented renowned educational institution of global significance.

At Kyushu University, the Interdisciplinary Graduate School of Engineering Sciences and the

Department of Earth Resources Engineering, Graduate School of Engineering have teamed up to build a unique curriculum for this particular program. Graduate students who are enrolled in one of the three specialized majors (materials science, system engineering, and resources engineering) will also complete coursework in environmental science, basic sociology, and economics. Furthermore, with the knowledge and practical experiences gained domestically and overseas, students will attain the five abilities (*research, practical understanding, global perspective, objective appraisal, and leadership*) required to be a part of a human resource network in Asia. Furthermore, they will receive the doctoral degree with “Advanced Graduate Program in Global Strategy for Green Asia” certification upon completion of the program.

Our educational program aims at developing leadership in science and engineering to realize a balance between greening and economic growth in Asia. The entire world faces a challenge of maintaining positive economic growth while drastically reducing resource consumption. Asia encompasses great cultural and social diversity; it is a typical melting pot model of an area with complex economic and environmental problems.

An effective strategy has never been implemented to enable countries to accomplish sustainable economic growth while dealing with environmental and resource restrictions related to mass consumption of fossil fuels. In this century, our country’s role is to develop a global model that distinguishes itself from the Western-centric model so as to realize a green Asia. Negative influences from globalization have emerged, such as the ever-widening gap between the rich and the poor, rapid energy consumption in Asia, and rising price of fossil resources. The Global Strategy for Green Asia is a flexible approach based on socially, industrially, and economically independent development that has arisen within Asia and Oceanic history and culture. Such approach with a strong global network generates a synergistic effect between greening and growth.

## **2. Administrative System**

The major pillars of this program are three departments (Applied Science for Electronics and Materials, Molecular and Material Sciences, and Energy and Environmental Engineering) from Interdisciplinary Graduate School of Engineering Science and one department (Earth Resource Engineering) from the Graduate School of Engineering. In carrying the program into execution, the above four departments have been cooperating closely with research institutions within Kyushu University, as well as private sectors, local governments, and academic institutions overseas. The activities during a period from April 2016 to December 2018 are summarized in **Appendix 1**.

### **2.1. Management Organization**

The current managing organization consists of two boards, three committees, and several working groups (**Figure 1-3**). The Management Board has been expanded so as to include core members of the other committees. High priority is given to the Academic Affairs Committee under which several related working groups are set. Such an organization makes it possible to manage the Green Asia Program effectively, mainly by reducing unnecessary meetings.

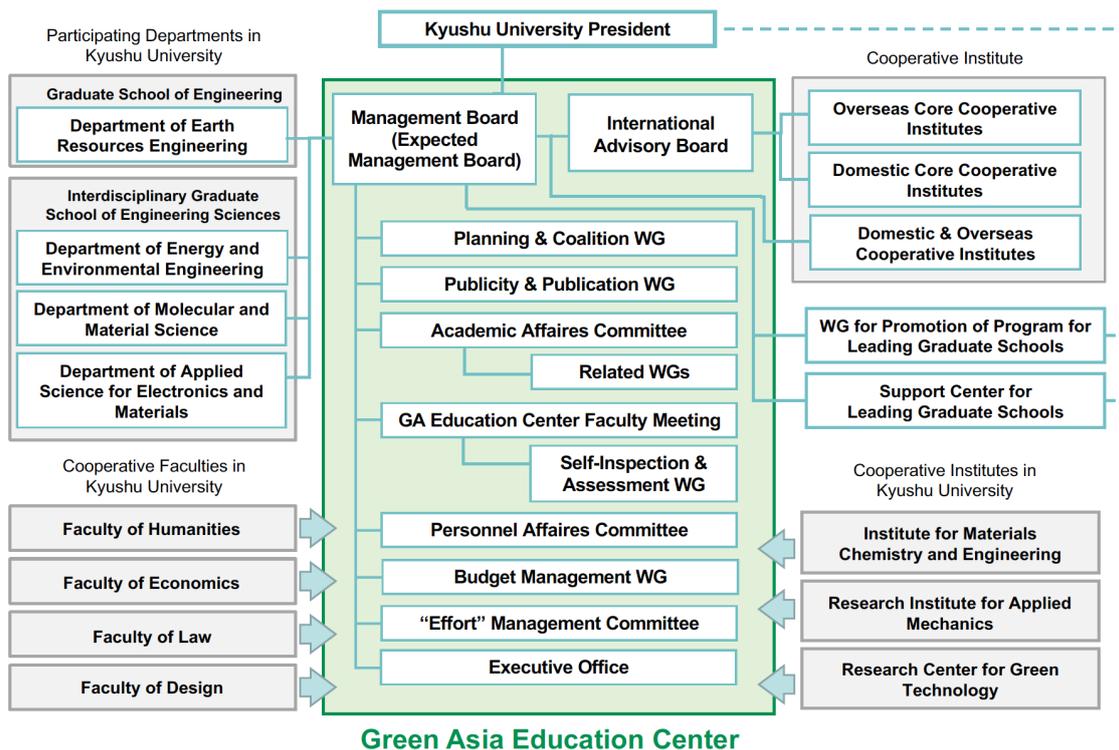


Figure 1-3. Management organization as of April 2018.

## 2.2. Green Asia Education Center

The Green Asia Education Center was established on December 2012 as the educational facility that conducts the Green Asia Program. The committees and working groups shown in the preceding section are managed by this center. At the beginning of 2018 academic year, the number of the faculty members belonging to the center was 7 (1 professor, 2 associate professors, and 4 assistant professors), and the number of the staffs belonging to the executive offices of the center was 13 (1 chief, 4 administrative assistants, and 8 technical staffs).

## 2.3. Rules

The rules and regulations that govern the Green Asia Program are listed below (for details, see **Appendixes 2-12**).

### Regulations for Kyushu University

- Regulations of Kyushu University; Article 13 (**Appendix 2**)
- General Regulations of Graduate Schools of Kyushu University; Article 17 (**Appendix 3**)
- Regulations for Kyushu University Program of Leading Graduate Schools (**Appendix 4**)
- Regulations of the Green Asia Education Center (**Appendix 5**)
- Provisions for the Financial Allowance of the Program for Leading Graduate Schools of Kyushu University (**Appendix 6**)
- Tuition Fee Support for Students of the Kyushu University Program of Leading Graduate Schools (リーディングプログラム学生に対する授業料援助制度) (**Appendix 7**)

- Provisions for Assistance to Centers of Special Large-Scale Education and Research Projects (特定大型教育研究プロジェクトの拠点への支援に関する要項)
- Program for Leading Graduate Schools Financial Allowance System—Explanatory material (**Appendix 8**)
- Program for Leading Graduate Schools Payments Ledger
- Pledge (for recipients of the financial allowance)

#### **Regulations for the Interdisciplinary Graduate School of Engineering Science**

- Regulations of the Interdisciplinary Graduate School of Engineering Sciences of Kyushu University (**Appendix 9**)
- Report on the Establishment of the Special Education and Research Course (特定教育研究講座の新設等に係る報告書)
- Plan for the Establishment of the “Global Strategy for Green Asia” Course at the Interdisciplinary Graduate School of Engineering Science (総合理工学府・コース新設計画書：グリーンアジア国際戦略)
- Qualification as a Faculty Member and Tutor/Mentor at the Inter disciplinary Graduate School of Engineering Science

#### **Regulations for the Graduate School of Engineering**

- Regulations of the Graduate School of Engineering of Kyushu University (**Appendix 10**)
- Report on the Establishment of the Special Education and Research Course (特定教育研究講座の新設等に係る報告書)
- Plan for the Establishment of the “Global Strategy for Green Asia” Course at the Graduate School of Engineering (工学府・コース新設計画書：グリーンアジア国際戦略)

#### **Regulations for the Green Asia Education Center**

- Green Asia Education Center - Internal Regulations Regarding the Use of Library Facilities (**Appendix 11**)
- Green Asia Education Center - Internal Regulations for Lending Laptop Computers (**Appendix 12**)

### **3. Comments and Response**

During April 2016–December 2018, we had three times of site visit by the program officer (March 2017, January 2018 and April 2018). Also, there was an on-site inspection by the committee members (August 2016). The followings are the comments and matters which were pointed out in the subsequent reports, *i.e.* the On-Site Inspection Report 2016, the Program Officer Follow-up Report 2016, and *ibid.* 2017. Our responses to them are also shown here. We omit the ‘questions and answers’ done on the site because noting down them goes into particulars too much. The Program Officer Follow-up Report 2018 will reach us in the next autumn.

## On-Site Inspection Report 2016

- (1) The program aims to develop exceptional leaders in science and engineering who can contribute to the realization of Green Asia, but we still feel it is not necessarily clear how the actual contents and state are related to the theme, 'Green Asia'. It is hence desirable to incorporate the features of Green Asia more into the program.

### **Response:**

To accomplish the purpose of the program, the following subjects and course works are being implemented. First in 'Social, Environmental, and Economic Systems', students acquire basic knowledge to consider various problems arising in the regions including Asia. On the basis of it, in 'International Exercise', they examine various issues such as 'technologies and industrial structures', 'industrial cooperation on the Asian scale', 'society and economy in the future', etc. The discussions on the above themes are integrated with their own specialized knowledge to write a paper about Green Asia science and technology studies (*i.e.* Green Asia Thesis), which is imposed as one of the pre-requirements to advance towards Ph.D. thesis review. Furthermore, 'Industrial Systems' contains an exercise on the project management development in foreign countries.

In 'Overseas Short-term Trips', students visit various industries in Asian countries. In addition, we have an extensive partnership network with six collaborative institutions overseas and Japanese industries who have activity bases in Asian. Through these we have been accepting a lot of course students from Asian countries.

- (2) In order to raise the international recognition of universities in Japan, we wish the program would send out its outcomes in English whenever possible.

### **Response:**

As for offering information, we have been making efforts to offer not only in Japanese but also in English since the beginning of the program. These include upgrading of website (English version) and the publication of Activity Report, Bulletin, and Evergreen, an cross-disciplinary international journal.

- (3) From the information exchange with students, we were able to know that the principles of the program have become accepted by the course students. On the other hand, there were an opinion that the program packs contents too much. As for 'Laboratory Rotation', the number of laboratories to stay during the master course is currently two (except their own laboratory), which seems to be a burden to students. There was a demand that this number should be decreased to one, and research in the remaining one laboratory should be conducted during the doctor course. One more request was that an appropriate guidance is necessary so that a student can conduct 'Laboratory Rotation' and 'Internships' under the condition closely related to his/her own research.

### **Response:**

To reduce the burden of 'Laboratory Rotation', we have revised the curriculum rule since the second semester of 2017 so that doing research in one laboratory (except own lab) is also okay.

As in the past, students can select the destination from the following three patterns depending on their interest and suitability: 1) a field which is adjacent or closely related to their own, 2) a surrounding field in science and engineering which is different from their specialty, and 3) a field in humanities/social sciences which is far from their own.

As for internships, especially 'Practice School' (the internship done during master course) and 'Domestic Internship' (done during doctor course), we have recommended students to apply the industrial internship programs offered by external institutions such as C-ENGINE (Collaborative Education for Next-Generation Innovators and Exploration of Knowledge Inspections), METI (Ministry of Economy, Trade and Industry), etc. The aim was not only for finding destinations closely related to their own researches but also for increasing the possibility of employment at industries after finishing the program course. Until now eight course students including those from overseas experienced industrial internships using the programs offered by the above institutions.

- (4) We visited the classes of 'Practical English' and 'Afternoon Colloquium'. All the students attending the former class were foreign students, and a textbook entitled "Academic English for Graduate Students" was being used. The latter class was being operated using the Remote Lecture System. It was disappointing that the class was not a place for discussion including students from the remote campus. Moreover, in both two classes, students were passive. There is still room for further improvement in the style of lectures.

**Response:**

As a whole, the course subjects are designed so that students would not be passive. For example, in 'Industrial Systems' (3) and (4), practical exercises are done on the international standardization and on a project management, respectively. In 'Environmental Systems' (1), discussions are made concerning various environmental problems. In a 'Practical English' class, students make presentation on a rotating basis. In 'International Exercise A', each of doctor course students reports his/her current progress of survey done towards Green Asia Thesis. Furthermore, they are imposed a discussion on a certain theme in the Student Session which is formed during the International Forum for Green Asia. Joining the discussion is a part of 'International Exercise B'.

- (5) As for the financial support for students after the termination of program support from the Japanese government, students are informed at the stage of recruitment about a possible discontinuation of financial support. As a result, the number of applicants looks decreasing. It is necessary to take steps immediately towards calling excellent students, especially Japanese students. In addition, it is desirable to start a discussion about treatment of the faculty members employed by the Green Asia project.

**Response:**

To get excellent Japanese students, since the academic year of 2016 we newly introduced an selective examination before entrance into the graduate schools, in parallel with the normal examination which is done after the entrance. Students who passed this new selection can act as

Green Asia student being financially supported immediately after they entered the graduate school. As a result, there were four applicants (including three from outside), and all of them passed the examination to be sixth-batch domestic course students.

We have also made efforts to secure career paths of the faculty members employed by this program. For example, in January 2016 one professor moved to the International Institute for Carbon-Neutral Energy Research within Kyushu University as a full professor. One assistant professor was promoted to an associate professor at Graduate School of Engineering (GSE hereafter), Kyushu University in November 2016, and right at the same time another assistant professor was adopted as a 'super-excellent young researcher' at Interdisciplinary Graduate School of Engineering Science (IGSES hereafter), Kyushu University. At the beginning of April 2018, one assistant professor moved to an external university as an associate professor. To treat some of the other academic staffs, we are securing research projects along with financial resources within IFC (Internationalization and Future Conception) division in IGSES.

- (6) In order to improve the vitality of the program, it is desirable to increase the industries which cooperatively participate the program. In addition, we wish the program would increase the students' employment rate to industries through internships.

**Response:**

'Practice School' and 'Domestic Internship' provide the course students with opportunities in which they experience activities at industries and/or institutions other than universities. In 'Inter-national Internship', they stay outside mother countries to experience international research activities as well as exchanges. In addition, 'Domestic Short-term Trip' offers an opportunity to visit companies in Japan. Through these attempts, we aim to enhance 1) the student's motivation to enter industries or research institutes of private companies, and 2) the possibility to work overseas. As was noted in (3), until now eight course students including those from overseas experienced internships at industries using the programs offered by C-ENGINE and METI. Besides these, we provide course students with employment trial interview, which is a place for students' self-appeal and interviewers are from industries.

As results of the above efforts, of the eleven 1st- and 2nd-batch graduates, four people found a job in industries and other three entered research institutions; the rest three were employed at universities. Of the eight domestic students who are going to graduate in the academic year of 2018, six students want to enter the companies. Of the nine overseas graduating students, three people wish to find a job in Japanese companies.

**Program Officer Follow-up Report 2016**

- (1) On the whole, there is no big problem; the program seems to be going forward smoothly. Although the number of domestic students is certainly not many, the program has been making efforts towards getting excellent Japanese students. One of such attempts is the introduction of selective examination which is done before entrance into the graduate schools. It is desirable for such efforts to be continued.

**Response:**

We will continue these attempts to get excellent Japanese students.

**Program Officer Follow-up Report 2017**

- (1) The number of Japanese students is not many, which I pointed out so far. Of course, I know well that the program has been making a lot of efforts to overcome this, but still more plan or scheme is required.

**Response:**

This issue will be succeeded by a new program. Although the education within the framework of the current program lasts until the students who entered program in the academic year 2018 will complete it, we are planning in parallel to start a new 5-year consistent doctorate program in IGSES in April, 2019. The new program is to be connected to our current program course seamlessly, taking over the basic principles and features the current program. It is to be designed so that the load of credit earning is reduced and the curriculum responds appropriately to the theme of the individual student. It is expected that more Japanese students join the program.