The Role of the Graduate School of Environmental Studies, Tohoku University
– From Regional to Global –

It is obvious that the most crucial task that we are facing now and also in the future is to solve environmental problems. We all dreamed of a 21st century full of hope, but the century has been confronted with growing problems of population, resources, energy, climate change, water, food, and infectious diseases that threaten the sustainability of the earth. In order to build a sustainable society, it is necessary to devote all our efforts to solving environmental problems and harmonizing development with the global environment. Not only should each research field work on each individual problem, but it is also necessary for researchers from various academic disciplines such as arts, science, engineering and medicine to unite and work together for the betterment of humanity.

The Graduate School of Environmental Studies, Tohoku University was established in the spring of 2003. Faculty members from engineering, science, social science, and cultural sciences gathered to work on a common research and education target “Development of Environmental Studies”. This demands extra efforts to work across the boundaries which exist for each discipline. We are sure that we have created a new fusion between science and humanities, but we must consolidate this further and embark on a new mission to strengthen this multidisciplinary foundation.

One of the most important missions of the University is to supply to our society men and women with superior talents. The students whom we try to nurture should have expertise in basic
Philo\(s\)ophy

It is essential to view science and technology as disciplines that can peacefully coexist with the environment. Such a view necessitates a paradigm shift toward a new perspective that differs from those of past centuries. The Graduate School of Environmental Studies was established in April 2003 to play a responsible role in constructing future-evolutional social systems through spreading new environmental coexistence-based state-of-the-art academic research to the world as a university that possesses advanced scientific and technological knowledge.

The Graduate School of Environmental Studies is intended to create a social system that can become bases of a cultural and recycle-based society which supports sustainable development by integrating the "knowledge" of Tohoku University as a comprehensive university. In order to train people to acquire high-level knowledge and skills and to become individuals who can tackle myriad challenges on a global scale in the 21st century, we strive:

- To construct an environmental science including environmental management that integrates the humanities and science;
- To train people to acquire high and comprehensive competence and become able to serve active roles in international society;
- To implement education and research to pursue sustainability of human life space;
- To implement education and research to analyze environmental issues from diverse perspectives, taking regional and ethnic factors into consideration;
- To implement education and research for the construction of an energy system that is in harmony with the environment;
- To implement education and research for the creation of an efficient recovery and utilization system of materials and biotechnology that can coexist with nature;
- To implement education and research for the creation of new recyclable resources and reproductive technologies that support a recycle-based society; and
- To implement education and research for the planning of an environmental creation scheme in order to build symbiotic social structures.
Admission Requirements for Admission

The Graduate School of Environmental Studies offers eight courses for graduate students:

- Regional Environment and Socio-Cultural Studies
- Geosystems and Energy Sciences
- Environmental Chemistry and Ecoengineering
- Ecomaterial Design and Process Engineering
- International Program for Environmental Sustainability Science
- Graduate Course in Strategic Environmental Management and Sustainable Technology Solutions

Master's Program

Those who wish to be admitted as graduate students to the Master's Program are required to have completed undergraduate level education in a college or university either in Japan or abroad, or to be judged as equivalent to those who have completed undergraduate level education. Applicants are required to pass written and oral examinations on academic subjects of a specified department, in addition to a foreign language test. A Master of Interdisciplinary Studies degree is conferred upon those enrolled graduate students who have earned 30 credits of required course work, submitted a thesis and passed the final examination on the thesis.

Doctoral Program

Those who wish to be admitted as graduate students to the Doctoral Program are required to have received a Master’s degree at a college or university in Japan or abroad, a degree equivalent to those who have received a Master’s degree, or to be judged as equivalent to those who have received a Master’s degree. They are then required to pass written and oral examinations on their Master’s thesis. A Doctor of Philosophy degree is conferred upon those enrolled graduate students who have earned 16 credits of required course work, submitted a thesis and passed the final examination on the thesis.

Academic Calendar

The Graduate School of Environmental Studies has an academic year that is comprised of two semesters, including spring and summer vacation periods. Consequently, application and admission are possible twice a year. Closing dates for applications depend on the course commencement date, which are usually in the middle of June (for October enrollment) and the beginning of January (for April enrollment). The 2014/2015 academic year is divided as follows:

1st semester: from April 1, 2014 to September 30, 2014
2nd semester: from October 1, 2014 to March 31, 2015
Educational Course of Graduate School of Environmental Studies

Course 01  Regional Environment and Socio-cultural Studies

Many environmental problems have arisen around the World. To resolve these problems, it is necessary to consider a range of regional environmental and social/cultural issues. In this integrated course, we elucidate the interrelationship between Man and the environment, and development of a sustainable socio-cultural system.

We investigate a range of geographical, political and economics systems, to highlight the interaction between historical, cultural and social systems and the natural environment. Furthermore, the students will be taught to objectively and critically consider the effects of industrial development on the environment.

Master’s Course

Doctoral Course
Advanced Lecture on Environmental Geography, Special Lectures on Regional and International Environment, Advanced Urban Environment, Environment and Civilization II, Internship for Doctor Course Students, Special Lecture II, Special Seminar II, Advanced Seminar on Regional Environment and Socio-Cultural Studies, Doctor Course Seminar on Regional Environment and Socio-Cultural Studies

Course 02  Geosystem and Energy Sciences

In this course, students will be introduced to fundamental processes related to the dynamic earth environment system, such as energy cycles, and shown how these processes relate to the overall global environment. The students will be taught about a number of special topics such as, instrumentation techniques for monitoring the earth’s lithosphere, hydrosphere and atmosphere, as well as utilization of clean energy resources, and technological systems designed in the earth’s crust for environmental conservation.

Master’s Course

Doctoral Course
Course 03  Environmental Chemistry and Ecoengineering

In this study, students are systematically introduced to the way physical chemistry and chemical engineering is used to protect the environment. The course describes molecular transformation and chemical reaction processes that are designed to avoid discharge of unfriendly material to the environment; efficient chemical reactions that detoxify environmentally unfriendly materials; technologies that efficiently utilize or reuse natural resources (such as various chemical substances, fossil fuel, biomass, etc); and technologies to chemically monitor environmentally unfriendly materials. In addition, students learn about the environment and ecological/life cycles, in order to recognize the relationships between chemical processes within the body and interactions between the environment and functions of living organisms.

Master's Course

Doctoral Course
Advanced to Environmental Resources Chemistry, Advanced Environmental Biotechnology, Advanced Ecomaterials Engineering Systems, Environment and Civilization II, Internship for Doctor Course Students, Special Lecture II, Special Seminar II, Advanced Seminar on Environmental Chemistry and Ecoengineering, Doctor Course Seminar on Environmental Chemistry and Ecoengineering

Course 04  Ecomaterial Design and Process Engineering

Here, we offer a comprehensive course, which includes an evaluation of the environmental load caused by industrial production processes, the development of environment-friendly processes for material production, and functionalization technologies of materials. We use the life cycle assessment (LCA) method to evaluate the environmental load and impact caused by the manufacturing, utilization and disposal of industrial products. This course focuses on the aspects of material recycling technologies and efficient resources usage in the material production processes, including assessment of current processes and design of future sustainable processes. Further, we offer instructions on the design of surface and bulk functions of materials, which play an important role in environmental protection and new energy development.

Master's Course

Doctoral Course
Course 05  International Program for Environmental Sustainability Science

This Graduate Course is named IPESS, International Program for Environmental Sustainability Sciences. The features of this course are as follows: All lectures are given in English. Therefore, even if foreign students are not good at Japanese, they can learn easily. Secondary, this course has a wide curriculum concerning a natural sciences and social sciences related to the environment. Therefore, even the student who majored in not only a natural sciences but also social sciences can flexibly learn the environmental issues.

Master’s Course

Doctoral Course

Course 06  Graduate Course in Strategic Environmental Management and Sustainable Technology Solutions

This Graduate Course is named SEMSaT, Strategic Environmental Management and Sustainable Technology Solutions. The course is widely opened not limited to students but to business, public, NGO persons, who can acquire Master degree in 2 years by optimizing e-learning method and concentrated lectures about once in two months. The course target to produce graduates with bird eye view and management capability, who can draw up business system strategically, while environmental issues become more globally, deeply, and seriously.

Master’s Course
Refer to the legend on page 10 for educational courses and entrance examination group.
Cooperative Divisions

**Earth and Environmental Systems Design**
- **Laboratory**: Information Sciences for Environment
- **Professor**: Motoyuki Sato
- **Associate Prof./Senior Assistant Prof.**: Kazuhiro Takahashi
- **Assistant Prof.**
- **Educational Course**: 2
- **Institution**: CNEAS

**Crustal Complex Systems Design**
- **Laboratory**: Crustal Complex Systems Design
- **Professor**: Toshiyuki Hashida
- **Associate Prof./Senior Assistant Prof.**: Kazuhiro Sato
- **Assistant Prof.**
- **Educational Course**: 2
- **Institution**: FRI

**Extraction of Crustal Energy**
- **Laboratory**: Extraction of Crustal Energy
- **Professor**: Mikihiro Ito
- **Associate Prof./Senior Assistant Prof.**: Hiroyuki Shimizu
- **Assistant Prof.**
- **Educational Course**: 2
- **Institution**: IFR

**Society of Northeast Asia**
- **Laboratory**: Social Anthropology
- **Professor**: Masahisa Seta
- **Associate Prof./Senior Assistant Prof.**: Masahisa Seta
- **Assistant Prof.**
- **Educational Course**: 1
- **Institution**: CNEAS

**History on East Asia**
- **Laboratory**: History on East Asia
- **Professor**: Daiki Ueno
- **Associate Prof./Senior Assistant Prof.**: Atsushi Iwai
- **Assistant Prof.**
- **Educational Course**: 1
- **Institution**: IRIDS

**Environmental Sciences and Policies**
- **Laboratory**: Environmental Sciences and Policies
- **Professor**: Junsen Aso
- **Associate Prof./Senior Assistant Prof.**: Junsen Aso
- **Assistant Prof.**
- **Educational Course**: 1
- **Institution**: CNEAS

**Culture of Northeast Asia**
- **Laboratory**: Regional Study on Inner Asia
- **Professor**: Hitoshi Kurobayashi
- **Associate Prof./Senior Assistant Prof.**: Hitoshi Kurobayashi
- **Assistant Prof.**
- **Educational Course**: 1
- **Institution**: CNEAS

**Ethnic Culture and Environment**
- **Laboratory**: Ethnic Culture and Environment
- **Professor**: Kenji Yanagida
- **Associate Prof./Senior Assistant Prof.**: Kenji Yanagida
- **Assistant Prof.**
- **Educational Course**: 1
- **Institution**: CNEAS

**Physical Chemistry for Environmental Materials**
- **Laboratory**: Chemistry for Environmental Inorganic Materials
- **Professor**: Teojo Satoh
- **Associate Prof./Senior Assistant Prof.**: Teojo Satoh
- **Assistant Prof.**
- **Educational Course**: 3
- **Institution**: IMRAM

**Energy Conversion Chemistry**
- **Laboratory**: Energy Conversion Chemistry
- **Professor**: Itzuo Horma
- **Associate Prof./Senior Assistant Prof.**: Itzuo Horma
- **Assistant Prof.**
- **Educational Course**: 3
- **Institution**: IMRAM

**Physical Recycling Processes**
- **Laboratory**: Physical Recycling Processes
- **Professor**: Takaaki Nakamura
- **Associate Prof./Senior Assistant Prof.**: Takaaki Nakamura
- **Assistant Prof.**
- **Educational Course**: 4
- **Institution**: IMRAM

**Environmental System and Materials**
- **Designing of Environmental Physical Functions**
  - **Laboratory**: Designing of Environmental Physical Functions
  - **Professor**: Junya Kano
  - **Associate Prof./Senior Assistant Prof.**: Junya Kano
  - **Assistant Prof.**
  - **Educational Course**: 4
  - **Institution**: IMRAM

- **Analytical Sciences for Environmental Evaluation**
  - **Laboratory**: Analytical Sciences for Environmental Evaluation
  - **Professor**: Kazuaki Watanabe
  - **Associate Prof./Senior Assistant Prof.**: Kazuaki Watanabe
  - **Assistant Prof.**
  - **Educational Course**: 4
  - **Institution**: IMRAM

- **High-temperature Physical Chemistry of Materials**
  - **Laboratory**: High-temperature Physical Chemistry of Materials
  - **Professor**: Hiroyuki Fukuyama
  - **Associate Prof./Senior Assistant Prof.**: Hiroyuki Fukuyama
  - **Assistant Prof.**
  - **Educational Course**: 4
  - **Institution**: IMRAM

- **Eco-Friendly Materials and Systems**
  - **Laboratory**: Eco-Friendly Materials and Systems
  - **Professor**: Shin-ichim Otsu
  - **Associate Prof./Senior Assistant Prof.**: Shin-ichim Otsu
  - **Assistant Prof.**
  - **Educational Course**: 4
  - **Institution**: IMRAM

- **Materials Separation Processing**
  - **Laboratory**: Materials Separation Processing
  - **Professor**: Hiroyuki Shiba
  - **Associate Prof./Senior Assistant Prof.**: Hiroyuki Shiba
  - **Assistant Prof.**
  - **Educational Course**: 4
  - **Institution**: IMRAM

Institution
- **CNEAS**: Center for North East Asian Studies
- **FRI**: Fracture and Reliability Research Institute
- **IFS**: Institute of Fluid Science
- **IRIDS**: International Research Institute of Disaster Science
- **IMRAM**: Institute of Multidisciplinary Research for Advanced Materials
- **IMR**: Institute for Materials Research
Collaborative Divisions

Legend: Educational Courses
1: Regional Environment and Socio-cultural Studies
2: Geosystem and Energy Sciences
3: Environmental Chemistry and Ecoengineering
4: Ecomaterial Design and Process Engineering
5: International Program for Environmental Sustainability Science
6: Graduate Course in Strategic Environmental Management and Sustainable Technology Solutions

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<td>Process Engineering for Environmentally Adapted Materials</td>
<td>Yuichi Sato / Jun Okazaki</td>
<td>Kazuhito Kamei</td>
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<td>Nippon Steel &amp; Sumitomo Metal Corporation</td>
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<td>Global Environment</td>
<td>Hideaki Nakajima / Toshinobu Machida</td>
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<td>Environmental Risk Assessment</td>
<td>Hiroshi Asanuma</td>
<td>Mio Takeuchi</td>
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<td>Energy</td>
<td>National Institute of Advanced Industrial Science and Technology</td>
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<td>Biotechnical Eco-management</td>
<td>Yoshitomo Watanabe</td>
<td>Norio Matsumoto</td>
<td>3</td>
<td>*</td>
<td>Central Research Institute of Electric Power Industry</td>
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*Feel free to contact the Academic Affairs Section to obtain information regarding this department.

Multidisciplinary Research on the Circulation of Waste Resources

Legend: Entrance Examination Groups
Human / Social: Human and Social Science Group
Env / Geo: Environment and Geography Group
Chem / Bio: Chemistry and Bioengineering Group
Materials: Materials Group
Energy: Environmental & Energy Group

Control of Environmental Materials

Control of Environmental Materials

Graduate School of Environmental Studies 2014

Tohoku University
International Post-graduate Program in Human Security

Support Section

Graduate Course in Strategic Environmental Management and Sustainable Technology Solutions