

Program Courses, Supervises and their Lectures of International Graduate Program on Green and Sustainable Chemical Technologies

The courses, lectures and faculty members are listed below. Some of the lectures are by the collaborations with the partner schools and the national laboratories, which specializing the related research.

You may request your desired supervisor from the list.

1) COURSE IN ENVIRONMENTAL SCIENCE AND INFRASTRUCTURE ENGINEERING

- ① Advanced Lecture on Maximum Utilization Technology of Energy and Resources / Seiyo O, Professor
Fossil fuels such as coal and petroleum have been used in various forms until now in order to make human social activity productive. From this lecture, it is historically looked back upon the pollution problems generated in these processes. We have to consider how to reduce the environmental impact on resource utilization. Various techniques, such as control, management and treatment and recycling of wastes, efficient use of exhaustible fossil resources, and conversion processes on renewable energy or biomass refining technology, etc., will be outlined by an intensive lecture, and the concepts and concrete applied examples are introduced. It is important for basic knowledge of environmental sciences.
- ② Advanced Lecture on Biology for Environmental Control / Maki KAWAI, Professor
To understand Molecular biology and Biotechnology through reading articles and reviews.
Prerequisites: It is desirable to have knowledge regarding Molecular biology, Plant genetics, and Biochemistry.
Therme : To understand basics of biology and biotechnology. To understand the method of environmental biology.
Keywords: biotechnology, environmental stresses, molecular biology
- ③ Advanced Lecture on Optical Sensing Based on Light Scattering / Hiroshi KADONO, Professor
- ④ Advanced Lecture on Carbon Cycling in Aquatic Ecosystem / Takeshi FUJINO, Professor
Understanding Monitoring Methods
Field Survey, Data analyses, Qualitative analyses of aquatic insects
Keywords : Stream Ecosystem, Environmental Management
- ⑤ Advanced control theory for environmental support/ Satoshi YAMANE, Associate Professor

- ⑥ Advanced Course in Landscape Engineering/ Kiyotaka FUKAHORI, Associate Professor
Landscape phenomenon, conservation of regional landscape, recent international issues on urban landscape are discussed.
Keywords : Landscape engineering, environmental psychology on landscape perception.
- ⑦ Biological and Metabolic Engineering/ Masatoshi YAMAGUCHI, Associate Professor
To understand Molecular biology and Biotechnology through reading articles and reviews
To explain what you study.
Keywords : Metabolite technology, plant biomass, cell wall, DNA, genome, gene,
- ⑧ Advanced Lecture on Environmental Technologies/Kazuhiko SEKIGUCHI, Associate Professor
1. Understanding the chemical treatment of pollutants, especially the advanced oxidation process
2. Understanding the types, advantages and disadvantages of reactions
3. Understanding the device performance and cost required for practical use
4. Acquire the ability to evaluate the effectiveness of science and technology
Keywords: Environmental pollutants, Wastewater treatment, Chemical treatment, Advanced oxidation process
- ⑨ Advanced Energy Conversion/ Yasuhiro HASEGAWA, Associate Professor
This lecture and seminar are based on physics. So fundamental mathematics such as differential equation and algebra are required to solve the actual problem for physics. Understanding of fields of solid state physics, not only reading academic paper but also including background of the study and performing numerical calculations by computer with programing.
Keywords: Solid state physics, thermoelectric conversion

2) COURSE IN CHEMISTRY AND MATERIAL SCIENCE

- ① Advanced Lecture on Maximum Utilization Technology of Energy and Resources / Seiyo O, Professor
Fossil fuels such as coal and petroleum have been used in various forms until today, in order to make human social activity productive. This lecture is a historical look back on the pollution problems generated in these processes. We have to consider how to reduce the environmental impact on resource utilization. Various techniques, such as control, management, treatment and recycling of wastes, efficient use of exhaustible fossil resources, and conversion processes of renewable energy or biomass refining technology, etc., will be outlined by an intensive lecture and concepts and concrete applied examples are introduced. It is important for basic knowledge of environmental sciences.
- ② Advances in Catalysis/ Hideki KUROKAWA, Professor
- ③ Advanced Chemistry of Molecular Recognition/ Takuji HIROSE, Professor
Molecular recognition occurs in various field of chemistry. The most well-known term is key-and-lock theory. Recognition and discrimination occur not only reactions but also sensing of organic and inorganic chemical species and they are important for our life.

Therefore it should be useful to know and understand the nature of molecular recognition for your own research.

In this class, a couple of recent publications related to your research field will be reviewed and discussed. The publications need to include the effect of recognition on the reaction, sensing, and functional properties

Keywords : Molecular recognition, Chiral recognition, Asymmetric reaction, Sensing

④ Analytical Separation Chemistry II / Shingo SAITOH, Professor

⑤ Evolutionary Molecular Engineering/ Naoto NEMOTO, Professor

⑥ Chemistry of Glycoconjugates/ Koji MATSUOKA, Professor

⑦ Advanced Chemistry of Synthetic Organic Reactions / MIURA Katsukiyo, Professor

To learn and understand advanced reactions for organic synthesis. To utilize the latest knowledge for progress in learner's research. Reading and presentation of the latest papers on organic synthetic reactions

Keywords : Stereoselective Synthesis, Organometal, Lewis Acid, Molecular Catalyst, Transition Metal Complex, Radical Reaction

⑧ Advanced Chemistry of Molecular Recognition/ Shoichi YAMAGUCHI, Professor

⑨ Biological Information Molecules/ Miho SUZUKI, Associate Professor

⑩ Advanced Synthesis of Metal Complexes/ Yoshihiro ISHIMARU, Associate Professor

To understand basic chemical reactions in biochemistry.

Outline of physical chemistry and discussions on chemistry that models biological reactions.

Keywords : Organic chemical reaction, Supramolecular chemistry

⑪ Solid State Organic Chemistry/ Koichi KODAMA, Associate Professor

To understand the research about organic crystals for your research and writing papers.

Keywords : Organic crystal, Molecular recognition

⑫ Advanced Lecture on Environmental Technologies/ Kazuhiko SEKIGUCHI, Associate Professor

1. Understanding the chemical treatment of pollutants, especially the advanced oxidation process

2. Understanding the types, advantages and disadvantages of reactions

3. Understanding the device performance and cost required for practical use

4. Acquire the ability to evaluate the effectiveness of science and technology

Keywords: Environmental pollutants, Wastewater treatment, Chemical treatment,

Advanced oxidation process

⑬ Advanced Organosilicon Chemistry/ Ken HATANO, Associate Professor

⑭ Advanced Lecture on Computational Transport Phenomena/ Shunji HOMMA, Associate Professor

⑮ Advanced Lecture on Functional Surface Science/ Atsuhiko FUJIMORI, Associate Professor

It will be introduced the latest research results in the world from basic physicochemical events on precise structural analysis of ultra-thin organized molecular films and structural formation/function expression. The perpose is to provide cross-disciplinary universal knowledge and skills to PhD candidates who are expected to fly into the world as researchers.

keywords: Ultra-thin organized molecular films, Solid-state structure of crystalline polymers, Intermolecular interaction

⑯ Advanced Inorganic Materials/ Ikuo YANASE, Associate Professor

4) THE COMMON SUBJECTS

○ Special Exercise I /Program director, All course teachers
Special Exercise II /Program director, All course teachers

○ Special Study I /Program director, All course teachers
Special Study II /Program director, All course teachers

Improve the skills on problems identification, problem-solving, and independent and continuous learning. Conduct an exercise or a study related to the field-of-study chosen by the student. Furthermore, receive advice from academics in the area of specialization, and strengthened the essential research and academic knowledge systematically by reading specific books and research papers under the guidance of supervisors and assistant supervisors. Practice Interdisciplinary approaches through participation in complex workshops and seminars held in the program (Program for Highly-skilled Professionals for Development Sustainable Chemical Technologies applied to Asian Poverty).

keywords: Developing countries, Environmental problems in poor areas, Green sustainable chemistry (GSC)