Course number	G-ENE20 68022 LE28　G-ENE20 68022 LE77		
Course title (and course title in English)	Advanced Energy Conversion Science Advanced Energy Conversion Science	Instructor's name, job title, and department of affiliation	Graduate School of Energy Science 変換科学専攻教員全員 Graduate School of Energy Science Professor,Jun HAYASHI Graduate School of Energy Science Professor,KAWANABE HIROSHI Graduate School of Energy Science Professor,SUMIGAWA TAKASHI Graduate School of Energy Science Professor,IMATANI SHIYOUJI Institute of Advanced Energy Professor,NAGASAKI KAZUNOBU Graduate School of Energy Science Associate Professor,HORIBE NAOTO Graduate School of Energy Science Associate Professor,ABE MASATAKA Graduate School of Energy Science Associate Professor,KINOSHITA KATSUYUKI Institute of Advanced Energy Associate Professor,YAGI JURO Institute of Advanced Energy Associate Professor,KOBAYASHI SHINJI Institute of Advanced Energy Associate Professor,MORISHITA KAZUNORI

Target year	修士・博士	Number of credits	2	Year/semesters	2023/Second semester
Days and periods	Wed.3	Class style	Lecture	Language of instruction	English

[Overview and purpose of the course]

Subjects on the conversion, control and utilization of various kinds of energy from viewpoints of science and engineering are offered.

[Course objectives]

To understand subjects on the conversion, control and utilization of various kinds of energy

[Course schedule and contents]

Latest topics about energy conversion systems and their functional design are lectured in an omnibus class.

- Thermal Efficiency and Pollutant Emissions in Internal Combustion Engines
- Fundamental Research for Advanced Combustion Systems
- Laser Diagnostics for Combustion Research
- Ceramics and Their Applications to Energy-Related Machineries
- Energy Components and High Temperature Machine Design
- Nondestructive Evaluation for Energy Equipment and Materials
- Fusion Energy Conversion
- High temperature liquids for energy conversion
- Energy Conversion System for Electromagnetic Waves and Particle Beam

Continue to Advanced Energy Conversion Science(2)↓↓↓

Advanced Energy Conversion Science(2)

・Modeling of Radiation Damage Processes in Fusion Materials

[Course requirements]

None

[Evaluation methods and policy]

Attendance and report

[Textbooks]

Additional articles and documents are delivered if necessary.

[References, etc.]

（Reference books）

Introduced during class

[Study outside of class (preparation and review)]

To be announced in class.

（Other information (office hours, etc.)）

*Please visit KULASIS to find out about office hours.

Course number	G-ENE04 68026 LE28		
Course title (and course title in English)	Advanced Energy Science and Technology Advanced Energy Science and Technology	Instructor's name, job title, and department of affiliation	Graduate School of Energy Science Professor,DOI TOSHIYA Graduate School of Energy Science Professor,HIRATO TETSUJI Graduate School of Energy Science Professor,KASHIWAYA YOSHIAKI Graduate School of Energy Science Professor,MABUCHI MAMORU Graduate School of Energy Science Professor,HAMA TAKAYUKI Graduate School of Energy Science Professor,FUJIMOTO HITOSHI Institute of Advanced Energy Professor,OOGAKI HIDEAKI Institute of Advanced Energy Professor,Yuhei Miyauchi Graduate School of Energy Science Associate Professor,KAWANISHI SAKIKO Graduate School of Energy Science Associate Professor,IWAO KAWAYAMA Graduate School of Energy Science Associate Professor,MIYAKE MASAO Graduate School of Energy Science Associate Professor,HASEGAWA MASAKATSU Graduate School of Energy Science Associate Professor,HAKAMADA MASATAKA Graduate School of Energy Science Associate Professor,KUSUDA HIROMU Institute of Advanced Energy Associate Professor,KII TOSHITERU Institute of Advanced Energy Associate Professor,NAKAJIMA TAKASHI

Target year	修士・博士	Number of credits	2	Year/semesters	2023/Second semester
Days and periods	Wed.3	Class style	Lecture	Language of instruction	English

[Overview and purpose of the course]

This subject covers the essences of advanced energy science & technology. The basic principles are lectured of mineral resources and energy exploitation, physical chemistry, metallurgy and material science, fluid dynamics and heat transfer, mechanics, metallurgy and recycling, energy conversion and storage, fusion reactor materials design, microelectronics, laser engineering and space energy and resources. Attention is given to focus to establish environmentally friendly process technologies to sustain the development of our society. Each lecture ends with a requirement of report assignment.

[Course objectives]

・To study scientific and technical knowledge
on various researches related to the energy science and technology
and examples of approaches from science and engineering viewpoints
in energy- and environment-issues
・To establish basement of experise relevant to the Energy Science through report assignment

[Course schedule and contents]

Research topics in various research fields of the department are provided
in omnibus style. Contents and order of lectures depend on situation in each academic year,
and details of this subject, such as lecture schedule and lecturers, are posted and announced.

Example of contents:

Continue to Advanced Energy Science and Technology(2)↓↓↓

Advanced Energy Science and Technology(2)

- Synthesis and Processing of High-Temperature Superconductors
- Applied Superconductivity to Energy Apparatus
- Advanced Rechargeable Batteries
- H2 Utilization and Reduction of CO2 Emission in Iron and Steelmaking Field
- Recent R&D on Light Metallic Materials
- Plasticity of Environmentally-Friendly Metals
- Physics of Liquid Jet Cooling to Hot Materials
- Physics of Energy Materials and Its Application to Advanced Energy Systems
- Advanced Laser Development and Applications
- Generation and Application of Quantum Radiation Energy

[Course requirements]

None

[Evaluation methods and policy]

I estimate it as a report problem to impose by each lecture by a normal point.
I include evaluations such as the situation present about the normal point evaluation, and there is explanation about the details of the evaluation than each lecture person in charge separately.
I assume the thing which averaged the evaluation point of the student attending a lecture in each lecture a global assessment point.

[Textbooks]

I distribute a document as needed.

[References, etc.]

（Reference books）

I introduce distribution and the reference book of reference materials more as needed than a lecture charge teacher.

[Study outside of class (preparation and review)]

There is no designation

（Other information (office hours, etc.)）

I publicize it by notices for more information about lecture contents and the schedule.
For more information about office hours, please confirm it in KULASIS.

*Please visit KULASIS to find out about office hours.

Course number	G-ENE01 78023 LE28		
Course title (and course title in English)	Socio-Environmental Energy Science, Adv. Advanced Seminar on Socio-Environmental Energy Science	Instructor's name, job title, and department of affiliation	Graduate School of Energy Science 社会・環境教員全員 Graduate School of Energy Science Professor,MCLELLAN, Benjamin Graduate School of Energy Science Professor,SHIMODA HIROSHI Graduate School of Energy Science Professor,KAWAMOTO HARUO Graduate School of Energy Science Professor,TAKAYUKI KAMEDA Institute for Integrated Radiation and Nuclear Science Professor,UNESAKI HIRONOBU Graduate School of Energy Science Professor,KUROSAKI KEN Graduate School of Energy Science Associate Professor,OKUMURA HIDEYUKI Graduate School of Energy Science Associate Professor,OGAWA TAKAYA Graduate School of Energy Science Associate Professor,OGATA SEIICHI Graduate School of Energy Science Associate Professor,MINAMI EIJI Graduate School of Energy Science Associate Professor,ISHII HIROTAKE Institute for Integrated Radiation and Nuclear Science Associate Professor,UEBAYASHI HIROTOSHI

Target year	Doctoral students	Number of credits	2	Year/semesters	2023/Second semester
Days and periods	Fri.2	Class style	Lecture	Language of instruction	English

[Overview and purpose of the course]

To solve various problems of energy and environment, it is necessary to have broad knowledge and perspectives to analyze problems in a comprehensive and multifaceted manner. In this seminar, the professors and associate professors in the Department of Socio-environmental Energy Science provide omnibus lectures on wide-ranging leading research topics related to socio-environmental energy science.

[Course objectives]

By the end of the course, students will have advanced knowledge and a high level understanding of leading research topics related to socio-environmental energy science, and will be able to analyze various energy problems from engineering, sociological, political, economical, biological and environmental perspectives.

[Course schedule and contents]

The course will cover the following topics over 15 weeks including feedback. The order will be announced on the first day of class.

1. Ecology, Economy, and Environmental Consciousness (Prof. Keiichi Ishihara)
2. Energy Environmental Issues and Technology (Assoc. Prof. Hideyuki Okumura)
3. Introduction to "Energy Systems Study" (Prof. Tetsuo Tezuka)
4. Critical Materials and Unconventional Resources for Energy (Assoc. Prof. Benjamin McLellan)

Continue to Socio-Environmental Energy Science, Adv.(2)↓↓↓

5. Pyrolysis Mechanism as an Underlying Principle of Thermochemical Conversion of Biomass (Assoc. Prof. Haruo Kawamoto)
6. Risk Communication (Prof. Hiroshi Shimoda)
7. Advanced Technologies for Design, Operation and Maintenance of Power Plants (Assoc. Prof. Hirotake Ishii)
8. Atmospheric Environmental Problems in Asia I (Prof. Susumu Tohno)
9. Atmospheric Environmental Problems in Asia II (Assoc. Prof. Takayuki Kameda)
10. Energy Policy of Japan and Other Leading Countries (Prof. Hirotoshi Unesaki)
11. Strategy of Earthquake Disaster Mitigation (Prof. Katsuhiro Kamae)
12. Earthquake Motions and Earthquake Resistant Design (Assoc. Prof. Hirotoshi Uebayashi)
13. Risk Management of Information Society (Prof. Jun Yoshida)

[Course requirements]

No requirements

[Evaluation methods and policy]

The evaluation is based upon these factors. Out of a possible 100 points:
1.Short reports (80 points). The report subject will be provided in each lecture.
2.Class participation (20 points).

[evaluation policy]
Will be evaluated according to the grade evaluation policy of the Graduate School of Energy Science

[Textbooks]

Textbook (Advanced Seminar on Socio-Environmental Energy Science) will be distributed on the first day of class. Additional handouts may be distributed in class.

[References, etc.]

（Reference books）

Reference books will be introduced in class.

[Study outside of class (preparation and review)]

Students are recommended to read the textbook in advance of the lectures.

（Other information (office hours, etc.)）

*Please visit KULASIS to find out about office hours.

Course number	G-ENE01 78024 LE28 G-ENE01 78024 LE14		
Course title (and course title in English)	Zero-emission Social System Zero-emission Social System	Instructor's name, job title, and department of affiliation	Graduate School of Energy Science Associate Professor,OGATA SEIICHI

Target year	Doctoral students	Number of credits	2	Year/semesters	2023/Intensive, year-round
Days and periods	Intensive	Class style		Language of instruction	English

[Overview and purpose of the course]

Acquiring the basic thinking to design the social system through studying the zero-emission society from fundamental to application.

[Course objectives]

To understand the basic knowledge of Zero-emission system and the measures for realizing Zero-emission society.

[Course schedule and contents]

Spring Semester:
Attend the course, "Environmental Leadership A", given by the International Environmental Management Program of the Graduate School of Global environmental Studies (GSGES)
No.1 “Guidance” (Fujii) and “Agricultural activities and environmental problems under different climatic conditions” (Funakawa)
After the guidance of this lecture, the linkage of agricultural activities and generation of environmental problems are discussed with special reference to climatic conditions and respective ecological processes.
No.2 “Waste problems and International cooperation” (Fujii)
The current situation of global waste problems is surveyed. Additionally the case studies of international cooperation in this field in Asia-Pacific region will be shown and discussed.
No.3 "Domestic Wastewater Treatment Technology and Management in Thailand" (Boontanon)
The water quality of rivers in Thailand varies from low to extremely low. This lecture will provide the current situation and existing challenges of domestic wastewater treatment technology and management in Thailand.
No.4 “Water and Sanitation Management in Developing Countries” (Fujii)
Water is one of fundamental elements for human daily life, and UN MGDs (United Nation’s millennium development goals) include sustainable access to an improved water source and improved sanitation. However, introduction of current latest systems used in developed countries is practically impossible, and sometimes improper in developing countries. It is needed to introduce appropriate systems meeting the requirements in local conditions. This lecture gives fundamental factors for water use and discharge, and some examples of water use in developing countries.
No.5 “Energy and Environment” (Ogata)
The issues of the energy supply and demand and those of the energy-related environmental damage are discussed from the perspectives of systems study and international relationship. The history and current situations of the issues are explained as well as the ways of thinking for mitigating the problems.
No.6 “Global Environmental Changes and Health” (Takano)
Global environmental changes can affect health and diseases. You will learn about the health effects of a variety of environmental factors related to global environmental changes.

Continue to Zero-emission Social System(2)↓↓↓

Zero-emission Social System(2)

No.7 “ Student presentations and discussions ” (All)
Students give presentations on topics related to the above contents, and discuss them each other.

Fall Semester:
No. 9-15 Advanced Energy Seminar
Requirement is to attend the special lectures and submit the reports about the lectures.

[Course requirements]

Students must contact Ogata by email(ogata[@]energy.kyoto-u.ac.jp). The student will be given an explanation of the course.

[Evaluation methods and policy]

Reports and Presentations (Report should include the original ideas based on the study.)

[Textbooks]

Nothing

[References, etc.]

（Reference books）
Rajib Shaw and R.R. Krishnamurthy 『Global Challenges, Local Solutions』 （University Press, 2009）
The other books will be announced at the class.

[Study outside of class (preparation and review)]

Preparation homework is not required, but homework is recommended to follow up each lecture's contents.

（Other information (office hours, etc.)）

*Please visit KULASIS to find out about office hours.