APPENDIX I: IESC LABORATORY CODE AND KEYWORDS

Code	Laboratory name	Research keywords
Department of Socio-Environmental Energy Science		
S-1	Energy Social Engineering (Engineering for Social Systems)	Social Engineering, Recycle, Eco-Materials, Eco-Education, Effective Use of Energy and Resource
S-2	Energy Economics	Energy Systems Studies, Minerals-Energy Nexus, Policy Studies, Sustainability
S-3	Energy Ecosystems (Biomass Energy)	Bioenergy, Biochemicals, Pyrolysis, Gasification, Supercritical Fluid, Bioethanol, Biodiesel
S-4	Energy and Information (Human Machine Interface)	Human Machine Interface, Human-Machine System, Augmented Reality, Organizational Learning, Intellectual Productivity, Pro-environmental Behavior
S-5	Energy and Environment (Energy Environmental Impact)	Aerosol, Atmospheric Environment, Atmospheric Chemistry, Hazardous Atmospheric Pollutants, Environmental Dynamics, Environmental Impact Assessment
S-6	Energy Policy (KURNS)	Energy Policy, Nuclear Energy, Energy Security, Nuclear Security, Non-proliferation, Energy Best-Mix
S-7	Societal Energy Education (KURNS)	Materials Infomatics, Materials Science, Nucler Fuels, Thermoalectric Materials, Social Energy Education, Disaster Science, Hazard Evaluation, Earthquake Disaster Prevention Strategy
Department of Fundamental Energy Science		
K-1	Energy Chemistry	Energy Chemistry, Electrochemistry, Fluorine Chemistry, Molten Salt, Ionic liquid, Na Secondary Battery, Li Secondary Battery
K-2	Quantum Energy Processes (Materials Chemistry and Physics)	Organic Molecular Materials, Photochemistry, Inorganic Semiconductors, Solid State Physics, Photophysics, Photovoltaics, Light-Emitting Devices, Chirality
K-3	Functional and Solid State Chemistry	Inorganic Material Chemistry, Crystal Chemistry, Electrochemistry, Solid State Chemistry, Electrochemical Materials, Bio-environment Compatible Material, Functional Material Chemistry
K-4	Plasma and Fusion Science	Magnetically Confined Fusion Plasma, Laser-Driven High Energy Density Plasma, Space Plasma, Nonlinear Physics, Large-Scale Simulation
K-5	Electromagnetic Energy	Fusion Energy, Data Analyses of Plasma Experiments, Measurements and Diagnostics, Theory and Numerical Simulation
K-6	Plasma Physics	Microwave Spherical Torus Experiment, Plasma Wave Physics, Equilibrium, Stability and Transport, Plasma Diagnostics
K-7	High-Temperature Plasma Physics (IAE)	Heliotron J, Control of High Temperature Plasma, Plasma Heating, Plasma Diagnostics, Boundary Plasma Physics and Elementary Processes, plasma turbulence, complex system, data analysis
K-8	Eneregy Optical Properties (IAE)	Nanoscience, Nanotechnology, Solid State Physics, Solar Cell, Quantum Electronics, Data Driven Science
K-9	Interfacial Energy Processes (IAE)	Electrochemistry, Molten Salts, Ionic Liquids, CO_2 Conversion, Silicon Solar Cell, Li Secondary Battery, Na Secondary Battery, K Secondary Battery
K-10	Energy Nano Engineering (IAE)	Nano-science, Nano-materials, Solar Energy, Organic Photovoltaic Cells, Theoretical Biophysics, Statistical Mechanics of Liquids
K-11	Biofunctional Chemistry (IAE)	Nano-biotechnology, Protein Engineering, Chemical Biology, Synthetic Biology, Artificial photosynthesis, Bioenergy
K-12	Bioenergy (IAE)	Bioenergy, Biomass, Structural Biology, NMR, anti-HIV Enzyme, Prion Protein, Aptamer, Bioethanol
K-13	Fundamental Neutron Science (KURNS)	Nuclear Reactor Experiment and Analysis, Criticality Safety, Development of Radiation Detection System
K-14	Heat Transport System (KURNS)	Energy Conversion, Thermal Hydraulics, Multiphase Flow, Neutron Radiography, Computatianal Fluid Dynamics, Reactor Physics, Nuclear Data
Department of Energy Conversion Science		
H-1	Thermal Energy Conversion	Thermal Engineering, Power Engineering, Internal Combustion Engine, Pollutant Emission Control, Alternative Fuels
H-2	Conversion Systems	Thermo-Fluid Science, Combustion Science and Engineering, Alternative Fuels, Laser Diagnostics and Image Analysis, Computational Fluid Dynamics
H-3	Materials Design for Energy Systems	Nano-/micro-material, -Strength of Materials, Fatigue, Multiphysics, Metamaterial, Fracture Mechanics
H-4	Design for Functional Systems	Mechanics of Functional Materials, Nonlinear Continuum Mechanics, Elastoplasticity, Nondestructive Evaluation by Ultrasonics, Electromagnetic Methods, and Thermography
H-5	Advanced Energy Conversion (IAE)	Plasma Science and Technology, Fusion Technology, Fusion Energy Conversion , Fusion Application, Fusion Energy System Design, Social and Environmental Sustainability Evaluation
H-6	Plasma Energy Conversion (IAE)	Plasma Physics, Fusion Science, Heating and Current Drive, Plasma Diagnostics, Microwave Technology, High power neutral beam technology
H-7	Functional Energy Conversion Materials (IAE)	Materials Science and Maintenance Technology for Energy Systems, Fusion Reactor Materials, Nuclear Materials, Computational Materials Science

Department of Energy Science and Technology * IESC is available only for DOCTORAL programs		
O-1	Devices Physics	Crystal Alignment Techniques, Energy Materials, Thin Film Growth, Superconducting wires
O-2	Process and Energy	Thin Film Growth, Solid-State Battery, Energy Materials and Device Processing, THz spectroscopy
O-3	Materials Process Science	Materials processing, Electrochemical processing, Functional materials, Thin films, Aluminum batteries
O-4	Thermochemistry	Thermochemistry, Reduction of CO_2 emission, Environmental-friendly Processes, Recycling Processes
O-5	Resources and Energy Systems	Energy-saving materials, Multi-scaling materials, Rock engineering
O-6	Advanced Processing of Resources and Energy	Plasticity, Forming Simulation, Advanced Processing of Eco-materials, Material Modeling
O-7	Mineral Processing	Thermal Fluid Engineering, Resources Circulation, Mineral Processing
O-8	Quantum Radiation Energy Science (IAE)	Mid-Infrared and THz Laser, Nuclear Safety/Security, Renewable Energy System/Policy/Implementation
O-9	The Physics of Energy Materials (IAE)	Nanomaterials, Quantum Materials, Materials Science, Energy Functional Materials, Solar Energy Utilization, Thermal/Optical Engineering
O-10	Photon Energy Science (IAE)	Laser Application, Nanomaterials, Thin Film, Laser Processing, Hydrogen Energy, Spectroscopy

IAE (Institute of Advanced Energy, Uji), KURNS(Kyoto University,Institute for Integrated Radiation and Nuclear Science)

LABORATORIES LIST FOR INTERNATIONAL ENERGY SCIENCE COURSE

2024 INTAKE

This table shows the availability of student positions for the Academic Year 2024, relevant academic background and potential fields of undergraduate study for applicants' reference. Please note that this is not an exhaustive list of research areas the faculty members cover and also that only laboratories recruiting students for AY2024 are shown on this table.

Department	Code	Research group name	**Student position availability**		Required background ◆ Relevant background ◇ Tertiary level, not exhaustive											NOTES BY RESEARCH GROUP Remarks, other requirements and/or desirable knowledge etc.
			Master's program (Oct)	**Doctoral program (Apr/Oct)**	CIVIL/ENVIRONMENTAL ENGINEERING	MECHANICAL ENGINEERING	ELECTRICAL ENG. & ELECTRONICS	MATERIALS SCIENCE	EARTH RESOURCES	INDUSTRIAL CHEMISTRY	NUCLEAR ENGINEERING	MATHEMATICS & INFORMATION	FORESTRY	WOOD SCIENCE & TECHNOLOGY	BIO-ENVIRONMENTAL SCIENCE	
Socio-Environmental Energy Science	S-1	Energy Social Engineering (Engineering for Social Systems)	✓	✓	-	◇	-	◆	◆	◇	-	-	-	-	-	Also accepting students who are interested in and able to analyze social issues - requiring proficiency in statistics.
	S-2	Energy Economics	✓	✓	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	◇	Energy-systems study; Analysis and design of energy supply-demand systems including human decision-makers.
	S-3	Energy Ecosystems (Biomass Energy)	✓	✓	◇	-	-	◇	-	◇	-	-	◇	◇	◇	Undergraduate students in any natural science be accepted, preferentially in biomass-related fields. We study bioenergy and biochemicals from various biomass materials.
	S-4	Energy and Information (Human Machine Interface)	✓	✓	◇	-	◇	-	-	-	◇	◇	-	-	-	◇ Cognitive psychology ◇ Informatics ◇ Statistics
	S-5	Energy and Environment (Energy Environmental Impact)	✓	✓	◆		-	◇	◇	◇	-	-	-	-	◇	◆Environmental chemistry/physics
	S-6	Energy Policy KURNS	✓	✓	-	-	-	-	◇	-	◇	◇	-	-	-	Basic knowledge of energy policy and energy scenario study is preferred.
	S-7	Societal Energy Education KURNS	✓	✓	◇	◇	◇	◆	◇	-	◇	◇	-	-	-	
	Only the research fields of natural science are included in the list above. Applicants in fields of social and human science are also accepted in the Department of Socio-environmental Energy Science. Applicants are recommended to refer to the brochure and webpage of the Graduate School of Energy Science for detailed information on the research topics in each laboratory.															
Fundamental Energy Science	K-1	Energy Chemistry	✓	✓	-	-	-	◆	-	◆	-	-	-	-	-	
	K-2	Quantum Energy Processes (Materials Chemistry and Physics)	✓	✓	-	-	◇	◆	-	◇	-	-	-	-	-	
	K-3	Functional and Solid State Chemistry	✓	✓	-	-	-	◇	-	◇	-	-	-	-	◇	
	K-4	Plasma and Fusion Science	✓	✓	-	-	◆	-	-	-	-	◆	-	-	-	It is preferable that students understand the basics of mechanics, electromagnetics, and statistical physics.
	K-5	Electromagnetic Energy	✓	✓	-	-	◆	-	-	-	-	◆	-	-	-	
	K-6	Plasma Physics	✓	✓	-	-	◇	-	-	-	-	◇	-	-	-	It is preferable that students understand the basics of mechanics, electromagnetism, and statistical physics.

IAE: Institute of Advanced Energy, Uji KURNS:Kyoto University,Institute for Integrated Radiation and Nuclear Science, Kumatori Laboratories are restricted in accepting students in the context of nuclear non-proliferation.

Department	Code	Research group name	Student position availability		Required background ◆ Relevant background ◇ Tertiary level, not exhaustive											NOTES BY RESEARCH GROUP Remarks, other requirements and/or desirable knowledge etc.
			Master's program	Doctoral program	CIVIL/ENVIRONMENTAL ENGINEERING	MECHANICAL ENGINEERING	ELECTRICAL ENG. & ELECTRONICS	MATERIALS SCIENCE	EARTH RESOURCES	INDUSTRIAL CHEMISTRY	NUCLEAR ENGINEERING	MATHEMATICS & INFORMATION	FORESTRY	WOOD SCIENCE & TECHNOLOGY	BIO-ENVIRONMENTAL SCIENCE	
Fundamental Energy Science	K-7	High-Temperature Plasma Physics IAE	✓	✓	-	◇	◇	-	-	-	◇	◇	-	-	-	Knowledge of basic physics is preferable.
	K-8	Eneregy Optical Properties IAE	✓	✓	-	-	◇	◇	-	◇	-	◇	-	-	-	Knowledge of quantum physics, electrical engineering and material science is preferable.
	K-9	Interfacial Energy Processes IAE	✓	✓	-	-	-	◆	-	◆	-	-	-	-	-	Knowledge of inorganic chemistry and electrochemistry is preferable.
	K-10	Energy Nano Engineering IAE	✓	✓	-	-	◆	◆	-	◆	-	-	-	-	-	
	K-11	Biofunctional Chemistry IAE	✓	✓	-	-	-	-	-	◇	-	-	-	-	◇	Knowledge of organic & inorganic chemistry and biochemistry is preferable.
	K-12	Bioenergy IAE	✓	✓	-	-	-	-	-	-	-	-	-	◇	-	◇Life Science ◇Biochemistry & Molecular Biology
	K-13	Fundamental Neutron Science KURNS	✓	✓	-	-	-	-	-	-	◆	-	-	-	-	Knowledge of reactor physics
	K-14	Heat Transport System KURNS	✓	✓	-	◇	-	-	-	-	◇	-	-	-	-	
Energy Conversion Science	H-1	Thermal Energy Conversion	✓	✓	-	◆	-	-	-	-	-	◇	-	-	-	
	H-2	Conversion Systems	✓	✓	-	◆	-	-	-	-	-	◇	-	-	-	Thermo-Fluid Dynamics, Combustion Engineering
	H-3	Materials Design for Energy Systems	✓	✓	-	◆	◇	◇	-	-	-	◇	-	-	-	Strength and Mechanics of Engineering Materials
	H-4	Design for Functional Systems	✓	✓	-	◆	◇	◇	-	-	-	◇	-	-	-	Nonlinear continuum mechanics
	H-5	Advanced Energy Conversion IAE	✓	✓	-	-	◇	◆	-	◇	◇	-	-	-	-	
	H-6	Plasma Energy Conversion IAE	✓	✓	-	-	◆	-	-	-	◇	◇	-	-	-	
	H-7	Functional Energy Conversion Materials IAE	✓	✓	-	◇	-	◆	-	-	◇	◇	-	-	-	Mechanics and Thermodynamics of Nuclear Materials

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Energy Science and Technology	O-1	Devices Physics		✓	-	-	◆	◆	-	◇	-	-	-	-	-	Basic knowledge of solid state physics, inorganic chemistry, and crystal engineering is preferable.
	O-2	Process and Energy		✓	-	◆	◆	◇	-	-	-	-	-	-	-	
	O-3	Materials Process Science		✓	-	-	◇	◆	-	◇	-	-	-	-	-	
	O-4	Thermochemistry		✓	-	-	-	◆	-	◇	-	-	-	-	-	
	O-5	Resources and Energy Systems		✓	-	-	-	◆	◇	-	-	-	-	-	-	
	O-6	Advanced Processing of Resources and Energy		✓	-	◆	-	◆	-	-	-	-	-	-	-	
	O-7	Mineral Processing		✓	-	◇	-	◇	◆	◇	-	-	-	-	-	
	O-8	Quantum Radiation Energy Science IAE		✓	◇	◇	◇	◇	-	◇	◇	◇	-	-	◇	Accepting students who have interests in Renewable Energy Implementation
	O-9	The Physics of Energy Materials IAE		✓	-	◇	◇	◆	◇	◇	-	-	-	-	-	Basic knowledge of solid state physics is preferable.
	O-10	Photon Energy Science IAE		✓	-	◇	◇	◆	-	◆	◇	-	-	-	-	Basic knowledge of quantum mechanics or optics is preferred but not necessarily required.