# ESEP-G 2022 List of Host Laboratories ( June 27 - August 5, 2022 )

| No. | Department | Title | Host Professor | Research Topic & Research Description | Special academic conditions required for research | | | | Online | Campus | Lab website |
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| | | | | | 1) Prerequisite knowledge and/or special skills and level of proficiency | 2) Required academic background | 3) Academic or research project experiences beneficial during selection process | 4) Other conditions | | | |
| 1 | Civil Engineering | Professor/ Associate Professor | KOSEKI Junichi / WATANABE Kenji | Experimental study on mechanical behavior of geomaterials | Basic knowledge on soil mechanics and geotechnical engineering | Specialization in the field of civil engineering | | | NO | Hongo | http://geotle.t.u-tokyo.ac.jp/research/ |
| 2 | Civil Engineering | Associate Professor | SU Di | Bridge Engineering, Structural Dynamics | Structural mechanics and dynamics, basic programming knowledge | Civil Engineering | | | NO | Hongo | http://bridge.t.u-tokyo.ac.jp/index_e.html |
| 3 | Mechanical Engineering | Lecturer | MOUTERDE Timothée | Condensation droplets merging on a superhydrophobic surface can jump from the surface due to the conversion of surface energy into kinetic energy. The student will perform experiments with microscope and high-speed camera to understand this jumping process in various experimental conditions. Another possibility is for the student to develop image analysis algorithm for automatic quantification of condensation properties. | Knowledge in fluid dynamics or software development/image analysis | Physics, fluids mechanics, or image analysis (AI based or not) | Experience in experimental physics or image analysis development are not required but would be beneficial. | | NO | Hongo | https://mouterde-lab.com/ |
| 4 | Mechanical Engineering | Professor | SUZUKI Yuji | "Laser diagnostics of flame to wall interaction"<br>The wall effect is crucial for various combustors including internal combustion engines. However, especially, the knowledge on the wall chemical effect, by which the intermediate species in the flame are destructed through the surface reaction on the wall surface, is limited. In this topic, planar laser induced fluorecence will be used to characterize the wall chemical effect in a combustor. | basic skill in programing (such as C language)<br>optional:<br>combustion phenomena<br>reaction kinetics | Mechanical engineering<br>Chemical engineering | Laser-based measurement<br>or<br>Experiments related to heat transfer<br>or<br>Gas chromatography<br>or<br>Chemkin | Graduate students only | NO | Hongo | http://www.mesl.t.u-tokyo.ac.jp/ |
| 5 | Mechanical Engineering | Professor | SHIOMI Junichiro | Thermal energy engineering: Computational design or experimental improvement of thermoelectric materials or devices | Basic skills in programming or heat transfer experiments. | Mechanical Engineering, Physics, Materials Engineering, or Electrical Engineering | Any problem solving experience using computation or measurements | | NO | Hongo | http://www.phonon.t.u-tokyo.ac.jp/?lang=en |
| 6 | Precision Engineering | Professor | KUNIEDA Masanori | Study on electrochemical machining and electrical discharge machining | Anyones who are interested in material processing technologies are welcome. | Anyones who are interested in micromachining, materials processing technologies, manufacturing, production engineering, etc. are welcome. | Electro chemical and physical machining processes involve multi-physics phnomena. Any students who have fundamental knowledge about physics, mechanical engineering, materials, electrochemistry, and electrical engineering, etc. are welcome. | | NO | Hongo | http://www.edm.t.u-tokyo.ac.jp/wpKunieda/ |
| 7 | Systems Innovation | Professor | TAKAHASHI Jun | Advanced Composite Material Technology for Future Society<br>- CFRTP for the Future Transportation Society<br>- Innovative Simulation Technology for New Services<br>- Hybrid Materials for Improving Social Resilience | Mechanics of materials<br>Strength of materials | Mechanics of materials<br>Strength of materials | Composite material Carbon fiber reinforced plastics | | Available | Hongo | http://j-t.o.oo7.jp/index-e.html |

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| 8 | Systems Innovation | Professor | KOSHIZUKA Seiichi | Trainees will participate in the research activities in the ongoing projects in Koshizuka- Shibata Laboratory. The projects are of computer simulation and computer graphics using particle methods: for example, fluid dynamics, solid dynamics, flow in a mixing tank, rain water infiltration in a car, flooding, tsunami, etc. | Experience of computer programming using C or other languages.<br>Knowledge of basics of fluid dynamics. | | | | Available | Hongo | http://mps.q.t.u-tokyo.ac.jp/lab/ |
| 9 | Systems Innovation | Associate Professor | KANNO Taro | 1) Simulation or experimental study on team cognitive behavior analysis (e.g. team communication protocols; performance indicators; team behavioral tracking; multimodal data analysis)<br>2) Simulation of business continuity and recovery of the hospitals in disasters.<br>3) Others (if requested, related to human-centric systems design, operation, and management) | Intermediate JAVA and/or Python programming skill for the topics related to simulation or data analysis | | | | NO | Hongo | http://www.tkanno.net/ |
| 10 | Aeronautics and Astronautics | Associate Professor | IMAMURA Taro | Welcome to the Aircraft Design Lab. of UTokyo! We are developing our in-house CFD (computational fluid dynamics) solver called UTCart for the aerodynamic design of an aircraft. We will provide you with our CFD program to investigate the flow around an airfoil/aircraft during your stay. Usually, getting used to the CFD program is difficult in a short period, but our code is automated and easy to use. You can start working on the very first week (even on the first day) of your stay (as was the case of former students)! | 1. Fluid dynamics (Compressible flow if possible)<br>2. Basic theory of numerical simulation (finite difference, finite volume etc.)<br>3. Simple coding using python<br>4. Computer skill (Windows, Office, etc.) | Aerodynamics, Aeroacoustics, Aeronautics | Basic course on Computational Fluid Dynamics.<br>Development of model RC airplane. | | NO | Hongo | http://park.itc.u-tokyo.ac.jp/rinoielab/english/index.html |
| 11 | Electrical Engineering & Information Systems | Professor | NAKANO Yoshiaki | Semiconductor optoelectronic materials, devices, and circuits<br>Description: Compound semiconductor material and device technologies for semiconductor lasers, optical modulators/switches, photonic integrated circuits, high efficiency solar cells, and solar fuels are studied. | None | Basic study on optics and semiconductor physics. | None | | NO | Hongo / Komaba | http://www.ee.t.u-tokyo.ac.jp/~nakano/lab/e_index.html |
| 12 | Materials Engineering | Professor | WATANABE Satoshi | Molecular dynamics simulations using interatomic potentials constructed via machine-learning:<br>This project aims at understanding atomic processes such as diffution and crystallization by molecular dynamics simulations with interatomic potentials constructed via machine-learning (specifically, neural network). Specific tasks may include assesment and improvement of interatomic potentials, and analysis of simulation results using advanced methodology such as persistent homology. | None | Basic knowledge on solid state physics or materials science. Specifically, on atom dynamics in solids. | Molecular dynamics simulation; Python programming; machine learning; numerial analysis | | Available | Hongo | http://cello.t.u-tokyo.ac.jp/index.php?id=7 |
| 13 | Materials Engineering | Associate Professor | MATSUURA Hiroyuki | 1) Physical chemistry of non-metallic particle formation during solidification of steel: Experimental research to elucidate the precipitation mechanism of compounds and behavior of dissolved impurities in molten iron<br>2) Development of novel pyrometallurgical process for zinc: Electrochemical approach for purification of molten ZnCl2 | Interest and basic knowledge for pyrometallurgy<br>Interest for conducting lab-scale experiments | Interest and fundamental knowledge for chemical thermodynamics and electrochemistry | Better for having experiences of chemical analyses and use of SEM (not mandatory) | | NO | Hongo | http://www.pyro.t.u-tokyo.ac.jp/result/ |
| 14 | Chemical System Engineering | Professor | TAKANABE Kazuhiro | Electrocatalysis for energy conversion<br>Investigation on developing electrocatalyst materials will be conducted. The works involve practical experiments in laboratory, related to materials synthesis, characterization, and catalytic testings. | Basic knowledge in the field of chemistry, chemical engineering, and/or materials science. Safetry training is required before entering the lab. The chemical lab skill and knowledge is preferred. | Chemistry; Chemical Engineering; Materials Science. | Fundamental knowledge of chemistry, chemical engineering, and materials science. | | NO | Hongo | https://www.catec.t.u-tokyo.ac.jp/ |

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| 15 | Nuclear Engineering and Management | Professor | ABE Hiroaki | We deal with development of nuclear materials and fuels, and fusion materials, such as iron-based and Zr-based alloys. Especially, with those structural materials and their degradation under environments such as irradiation, corrosion, and hydrogenation. The location of our lab is in Tokai campus. Students will study in the Department of Nuclear Engineering and Management in Hongo campus (Tokyo), and do experiments in Tokai campus (Ibaraki prefecture) twice. | Materials science and engineering | Materials science and engineering | | Two times experiments are scheduled in Tokai. Student must bear the accommodation fee (about 4,000 yen) from the stipend. | NO | Hongo/ Tokai | http://www.tokai.t.u-tokyo.ac.jp/index.html |
| 16 | Bioengineering | Lecturer | NAKAGAWA Keiichi | 1) Ultrafast imaging: we will visualize the acoustic interaction with biological cells (pico- to nano-second timescales) to understand the therapeutic effects on the body in noninvasive acoustic wave therapy.<br>2) Biophotonics: we will develop a new method to produce acoustic waves inside the body to manipulate the photons' behavior for optical biotechnologies.<br>3) Biophysics: we will demonstrate sonogenetics --to control the activity of the cells, like optogenetics-- with genetically engineered sono-sensitive cells based on our photoacoustic technology. | None | None | Optical engineering (all topics), Cell biology (topic 1 and 3), Brain science (topic 2 and 3) | | NO | Hongo | http://www.bmpe.t.u-tokyo.ac.jp/en/index.html<br><br>https://sites.google.com/site/keinakagawa6 |

Available = Labs offering online courses