AY2024 Admission Guide

Department of Mechano-Informatics

Graduate School of Information Science and Technology
The University of Tokyo

Master’s Program

Doctoral Program

Contact [Department Administration Office]
Engineering Bldg. 2, 3rd Floor, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, JAPAN
Department Team (Mechano-Informatics), Graduate School of Engineering / Information Science and Technology Academic Affairs Division, The University of Tokyo.
TEL: 03-5841-6302 E-mail: kyoumu@office.mech.t.u-tokyo.ac.jp

Under “Prospective Students” on
https://www.i.u-tokyo.ac.jp/index_e.shtml
click on “Admissions” →“Departments and Faculty”
→“Mechano-Informatics” →“Admissions”

In addition to this brochure, be sure to refer to “Admission Guide: Graduate School of Information Science and Technology, The University of Tokyo.”
(1) Master’s Program

(1) Applicants should refer to the “AY2024 Admission Guide: Master's Program, Graduate School of Information Science and Technology, The University of Tokyo”.

(2) Preference Card and supervising professor
In the “Preference Card (for Master’s Program)”, indicate your preferences for the field of interest and research plan, etc., and submit the card together with your other application documents. Check “Faculty and Labs in Department of Mechano-informatics” at the end of this booklet and enter your selection of (up to 10) supervising professors in the field “Your selection of Lab” of the Web application system. Circle either Yes or No in the “Willingness to enroll” column in the “Preference Card (for Master’s Program)”.

(3) Expertise Assessment Card
Submit two-pages document to assess your expertise regarding research activities, creative activities in a university lecture or practicum, and extracurricular activities.

(4) Examination Schedules
a. Document screening
Document screening will be conducted based on the submitted documents. Regarding the notification of the screening, refer to the “AY2024 Admission Guide: Master's Program, Graduate School of Information Science and Technology, The University of Tokyo”.

b. General education subjects
Mathematics examination is conducted. Refer to the “AY2024 Admission Guide: Master's Program, Graduate School of Information Science and Technology, The University of Tokyo” for detail.

c. Foreign language (English)
TOEFL scores will be used to evaluate the applicants’ English skills. For details, refer to “Guidelines for Submission of TOEFL Scores (for AY2024 Entrance Examinations).”

d. Specialized subjects and oral examination
The examination will be conducted only for applicants who have passed the document screening and TOEFL scores are considered valid for submission. The oral examination will be held online.
### Examination Date

<table>
<thead>
<tr>
<th>Examination Date</th>
<th>Examination Times</th>
<th>Examination Subjects</th>
<th>Examination Content</th>
<th>Notes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 21 (Monday), 2023 – August 25 (Friday), 2023</td>
<td>Between 9:00 a.m. and 6:00 p.m.</td>
<td>Mechano-Informatics</td>
<td>Mechano-Informatics (Oral Examination) English presentation of expertise, field of study and research plan (7 minutes) and oral examination. Topics related to mechanics-related fields (mechanical dynamics, control, mechatronics, robotics, etc.) and information-related fields (fundamentals of information science, digital circuits, computers, software, etc.) might be asked during examination.</td>
<td>The URL of online examination will be announced by mid-August.</td>
</tr>
</tbody>
</table>

(5) Important Notes

- a. Applicant must prepare a Windows PC or Mac with an external web camera and connect to the Zoom for the online oral examination.
- b. Applicant must prepare slides for the presentation in advance and share the screen during the oral examination.
- c. Applicants wishing to enter the School in October must confirm their eligibilities with the Department Administration Office before submitting their applications.
- d. For other notes, carefully read the “Notes for Specialized subjects and oral examination” section of this guide.

Depending on social situations, the methods of the entrance examinations may be changed in the future. In that case, we will announce it on the webpage of the Department of Mechano-Informatics.
(II) Doctoral Program

(1) Applicants should refer to the “AY2024 Admission Guide: Doctoral Program, Graduate School of Information Science and Technology, The University of Tokyo”, and must receive guidance from their prospective thesis advisor before submitting their applications.

(2) Preference Card and prospective supervisor

After consulting with your prospective supervisor, indicate your preferences for the field of interest and research plan, etc., on the “Preference Card (Doctoral Program)”, and submit the card together with your other application documents. Enter the name of your prospective supervisor in the field of “Supervising professor of your choice” of the Web application system.

(3) Application Period

Note that different application periods are scheduled for Summer and Winter Examinations. For details on the application periods, refer to the “AY2024 Admission Guide: Doctoral Program, Graduate School of Information Science and Technology, The University of Tokyo”.

(4) Examination Schedules

a. Summer Examinations

1) Primary Examinations

The oral examination will be held online.

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<tr>
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Notes:

a. Oral Examinations for applicants expecting to complete a Master’s course in March 2024 will focus on the content and progress of the applicant's Master’s thesis or an equivalent research project, as well as concepts and plans for the prospective doctoral research theme, and related knowledge in the Mechano-Informatics field. Applicants must prepare slides for the presentation in advance and share the screen during the oral examination, and will be required to answer questions.

b. Oral Examinations for applicants who are expected to complete a Master’s degree by September 30, 2023 will simultaneously serve as Secondary Examinations. Refer to [Note] on Secondary Examinations below.
As an examination of foreign language skills, English proficiency will be evaluated based on submitted TOEFL scores. For details of how to submit TOEFL scores, refer to the “AY2024 Admission Guide: Doctoral Program, Graduate School of Information Science and Technology, The University of Tokyo”.

Applicants who have completed (or are expected to complete) a Master's program at the University of Tokyo are not required to submit TOEFL scores.

Supplementary information may be provided on the following web page. Be sure to check:
https://www.i.u-tokyo.ac.jp/edu/course/m-i/admission_e.shtml

2) Secondary Examinations
The Secondary Examination is conducted by oral examination.
Secondary Examinations will be conducted for those who pass the Primary Examinations, on the completed Master’s theses or equivalent research projects.
Secondary Examinations will be scheduled between late January and early February of 2024; applicants will be notified of the details later.

[Note] Applicant must submit a copy of one’s Master's thesis or an equivalent document and slides for the presentation according to a later notice. Share the slides on the screen during the oral examination to make a presentation on the content of research within a specified time limit, and answer questions.

b. Winter Examinations
Primary Examinations and Secondary Examinations will be held between late January and early February, 2024 to accept a few applicants.
Details on examination methods, schedules, and locations will be posted on the following web page in October:
http://www.i.u-tokyo.ac.jp/edu/course/m-i/admission_e.shtml

(5) Applicants for the Special Selection for Professionals（社会人特別選抜）must contact the Department Administration Office before submitting their applications. These applicants must include in the “Application Documents” specified in “AY2024 Admission Guide: Doctoral Program [Special Selection for Professionals], Graduate School of Information Science and Technology, The University of Tokyo” the following seven types of materials describing their research and achievements in the field of mechano-informatics. Applicants might be exempted from the written examination by the contents of “Application Documents”. No specific form is provided.
i. The list of research achievements (written in Japanese or English)
Provide a list of academic papers, patents, products, and other evidences of the applicant's achievements accomplished as a part of her/his profession. In the case of collaborative achievements with several persons, clearly indicate the applicant's contributions.

ii. The abstract of those major achievements (written in Japanese or English)
Select up to three major achievements from the list above, and provide the outlines of these achievements
iii. The research plan for the doctoral program (written in Japanese or English) in approximately two A4-sized pages.

iv. Recommendation letters from two persons who are familiar with research achievements of the applicant (including Master's supervisor) (written in Japanese or English).

*Refer to the admission webpage of the Graduate School for submission instructions and submit it separately.

v. A copy of a Master’s thesis or an equivalent research report.

vi. The abstract of v. (written in Japanese or English)

vii. The originals of any other documents which are useful to evaluate the applicant’s ability (e.g. copies of published papers, patent specifications or brochures of products by the applicant).

(6) Important Notes

a. Applicant must prepare a Windows PC or Mac with an external web camera and connect to the Zoom for the online oral examination.

b. Applicant must prepare slides for the presentation in advance and share the screen during the oral examination.

c. Applicants wishing to enter the school in October must confirm their eligibilities with the Department Administration Office before submitting their applications.

d. For other notes, carefully read the “Notes for Specialized subjects and oral examination” section of this guide.

Depending on social situations, the methods of the entrance examinations may be changed in the future. In that case, we will announce it on the webpage of the Department of Mechano-Informatics.
AY2024 Notes for Specialized subjects and oral examination of
Department of Mechano-Informatics (Master’s and Doctoral Programs)
Graduate School of Information Science and Technology, The University of Tokyo

1. Examination dates and times
   Please refer to the “Examination schedules” listed in this Guide.

2. Examination locations
   The oral examination will be held online.
   The URL for the online system that should be accessed by each person will be notified at a later date.

3. What to prepare
   (1) Examination admission card. (Print it out.)
   (2) Prepare a Windows or Mac with camera for the online oral examination.
   (3) Prepare slides (ex. PowerPoint) for the presentation in advance and share the screen during the oral examination.
   (4) Prepare an internet line of sufficient quality. Prepare an environment where no people around and stillness is maintained.
   (5) Prepare notebooks of A4 size or larger, sketchbooks or a whiteboard, which is required to show the answer in front of the camera and read it remotely, and a thick pen that can be viewed remotely.
   (6) Follow the instructions of the Graduate School for the ‘what to bring’ for the general education subject (Mathematics).

4. Items to keep in mind during examinations
   (1) Online examination is always being recorded.
   (2) Examinees will not be allowed to leave the examination room until the end of the scheduled examination time, even when s/he relinquishes answering. Temporary leaves during the examination are also prohibited in principle. If you start to feel sick and/or need to use the bathroom, notify the examination supervisor.
   (3) Be alone in a closed room during the examination. Do not use headphones or earphones.
   (4) Turn on the camera during the examination and do not use the virtual background.
   (5) Presentation tools and paper scripts during the presentation are acceptable, but do not refer to it in a question and answer session.
   (6) Reference text books and the Internet etc. are not allowed without permission.
   (7) The presentation time is managed in the examination room. However, a clock without any of the following functions can be used: dictionary function, calculator function, or Internet/PC connection function.
   (8) Print out examination admission card beforehand and place on top of your desk during the examination.
   (9) Only the following items can be placed on the desk: examination admission card, PC, Web camera, monitor, keyboard, mouse, A4 or above notes, sketchbooks or a whiteboard, and a thick pen.
   (10) If there is a bookshelf in front of or beside the desk, cover it with a curtain or sheet.
   (11) Before and during the test, you will need to move the camera to show the proctor your desk and the entire room where you will be taking the test (360degrees). Any privacy concerns should be dealt with in advance.
   (12) Do not record the test details. Also, do not tell anything about the test.
   (13) In the unlikely event that misconduct is discovered, the test will be invalidated retroactively.
   (14) After the oral examination, leave the online examination room according to the instructions from the examiner.

Follow the instructions and location information of the Graduate School for the written examination for the general education subject (Mathematics).
<table>
<thead>
<tr>
<th>Program</th>
<th>Master’s Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examinee’s name</td>
<td></td>
</tr>
<tr>
<td>Willingness to enroll (circle “Yes” or “No”)</td>
<td>If you are not assigned to any of the preferred advisors that you have indicated in the “WEB Application System”, will you still pursue enrollment? Yes / No</td>
</tr>
<tr>
<td>Field of interest and research plan</td>
<td>(Please describe in as much detail as possible)</td>
</tr>
</tbody>
</table>

Submit this form along with your application.

There is a possibility you will not pass the examination if you circle “No” in the “Willingness to enroll” box and are not assigned to any preferred advisor.

Use a computer to prepare this card.

Do not extend to the next page. The font size should be 12pt or larger.
<table>
<thead>
<tr>
<th>Program</th>
<th>Doctoral Program</th>
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<tbody>
<tr>
<td>Examinee's name</td>
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<tr>
<td>Field of interest and research plan (Please describe in as much detail as possible)</td>
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- Submit this form along with your application.
- Note that different application periods are scheduled for the Summer and Winter Examinations. Application documents received outside of the respective application periods shall be deemed invalid.
- Use a computer to prepare this card.
- Do not extend to the next page. The font size should be 12pt or larger.
[Expertise Assessment Card]

Department of Mechano-Informatics,
Graduate School of Information Science and Technology, The University of Tokyo

Examinee’s name:

- Write down the examinee’s name.
- Use this two A4 pages to write your expertise. No additional pages are allowed.
- Use a computer to prepare this card.
- The font size should be more than 12 pt. Images and diagrams can also be used.
# List of Department-specific Documents

<table>
<thead>
<tr>
<th>Master’s Course</th>
<th>Summer Examination</th>
<th>Winter Examination</th>
</tr>
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<tbody>
<tr>
<td>Preference Card (for Master’s Program)</td>
<td>All Applicants</td>
<td>Preference Card (for Doctoral Program)</td>
</tr>
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<td>Expertise Assessment Card</td>
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### Department-specific Conditions on TOEFL Scores

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<tr>
<td>All participants</td>
<td>All applicants except those who have completed (or are expected to complete) a Master’s program at the University of Tokyo</td>
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<td></td>
</tr>
</tbody>
</table>
Application form for the Transfer to the Online Examinations (Mathematics):
Regarding the Graduate School’s common “Mathematics” examination, transfer to an online examination may be permitted only if one of the conditions below is met. If you wish to request a transfer, please submit the application form that is designated by the Graduate School as soon as the condition occurs.

A. Those who live outside Japan and are unable to travel to Japan due to border restrictions.
B. Those who should avoid the on-site examination, having likely contracted an infectious disease (having symptoms such as fever or cough). For details, refer to the conditions for avoiding on-site examinations specified in the document “Examination Guideline for On-site Written Examination”, which will be delivered later to applicants.
Faculty and Laboratories of Department of Mechano-Informatics

※: Professors denoted by this symbol do not accept new graduate students for the applicable academic year.

[RCAST] denotes the professors of Research Center for Advanced Science and Technology holding adjunct professorship at School of Information Science and Technology.

[AI center] denotes the professors of AI Center (*1) holding adjunct professorship at School of Information Science and Technology.

*1 Next Generation Artificial Intelligence Research Division, Center for Education and Research in Information Science and Technology (CERIST), and Next Generation Artificial Intelligence Research Center, The University of Tokyo.

[IW center] denotes the professors of IW Center (*2) holding adjunct professorship at School of Information Science and Technology.

*2 Creation of Intelligent World Division, Center for Education and Research in Information Science and Technology (CERIST), and Center for Creation of Intelligent World, The University of Tokyo.
Research in this laboratory is focusing on the fundamental functions and systems necessary for future intelligent robots that will live and work in the daily life field and human society. The members are challenging something new through their own integrated robot systems and learning how to build sustainable systems for the future with each other.

1. Daily life support humanoid platform: recognition of situations in human life environments, using tools, dishes, tablewares, and appliances, learning from humans, conversation with humans, etc.
2. Musculoskeletal tendon-driven humanoid: humanlike musculoskeletal body with very many joints and numerous redundant sensors aiming at powerful and supple motions like human, design principle of humanoid body structure, autonomous development of complex sensory-motor system, etc.
3. Dynamics whole body control humanoid: integrating high-torque, high-speed motor drive circuit, high-speed 3D recognition system, dynamics whole-body.
4. Transform robotics devices: embedded CPU for transform robots, integrated intelligent, IMU sensors, onbody communication LAN system, power system, etc.
5. IRT (Information and Robot Technology) to support human and aging society: through fusing IT and RT systems, personal mobility robots, affectionate watching appliance are conducted for supporting the future life society
Laboratory for Intelligent Systems and Informatics (ISI)
http://www.isi.imi.i.u-tokyo.ac.jp/

**Breakthroughs Towards Truly Intelligent Systems in the Real World:**
Towards truly intelligent behavior in the complex and uncertain real world, we reveal the principles of human intelligence and develop next generation AI, with applications to real world tasks.

1. **Next Generation AI & Robotics Intelligence**
   Deep reinforcement imitation learning, multi-agent collaborative learning, dynamical systems/chaos/reservoir computing, spiking neural networks, free energy principle/predictive coding, dual-arm robotic manipulation, behavior emergence/immediate adaptation, autonomous systems, intention understanding, AI ethics

2. **Elucidating/Modeling Human Intelligence, Origin of Intelligence**
   Whole brain simulation, Embodied cognition/behavior, Emotion/Feeling Model, Fetus/neonate embodied brain development simulation, Acquisition of concepts/language, Self-other/social cognition, Emergence of consciousness, Brain science and modeling of moral/value/intention/motivation/creativity

3. **Bio-inspired Robots & Adaptive/Learning Control**

4. **AI Tech for Medical/Welfare/Handicapped & Global Issues**
   Monitoring & risk prediction of behavior/health, Clinical applications, Interactive elderly care robots, Understanding developmental disorders and alleviative technology for their sufferings, Agile-legal tech.
Research on Cybernetic Interface aims to study interfaces that unite human and computer seamlessly. Our particular interest is in exploring Cybernetic Interface on the basis of Virtual Reality (VR) and Computer Supported Cooperative Work (CSCW) technologies. We focus not only on system development, but also on exploring innovative contents in application areas, and studying the impact of human-computer interaction on psychological and social science research. Specifically, we are conducting research on multi-modal/cross-modal interfaces including tactile, olfactory, and gustatory senses, human augmentation technologies to enhance human physical and cognitive abilities, social robots, and educational systems using virtual and augmented reality.

**Virtual Reality / Mixed Reality**
- Multi-modal and Cross-modal Interfaces
- Redirected Walking / Redirected Hand Interaction Techniques
- Electrical Stimulation for Presenting Sensations
- Human Augmentation with Virtual and Augmented Reality
- Ghost Engineering (Augmenting Perception/Cognition with Embodied Avatars)

**Computer Supported Cooperative Work (CSCW) / Human-Computer Interaction**
- Telepresence Systems for Enhancing Remote Communication
- Behavior Elicitation & Emotion Evacuation Interfaces
- Virtual Reality-Based Education, Rehabilitation, Consultation
- Social Robot, Human-Robot Interaction, and social media
Dynamics and Control Systems Laboratory

http://www.ynl.t.u-tokyo.ac.jp/

(1) Highly Robust Autonomous Driving Systems of Cars and Trucks
(2) AI-based Autonomous Harvest/Transport Systems for Vegetables and Fruits
(3) Human Sports Motion Biomechanics
(4) Robot Control & Actuators for Dynamic, Flexible and Skillful Human Motion
(5) Advanced Optical Sensing and Image Understanding
Machine Intelligence

Realizing advanced intelligent systems for understanding real world, generating content, and discovering knowledge

We aim to construct advanced intelligent systems capable of understanding the real world, generating content, and discovering knowledge by extracting valuable information from the natural environment and combining it with vast amounts of data and powerful computing resources in cyberspace. To tackle this challenge, we utilize computer science, including mathematical foundations and robotics.

1. **Mathematical foundations:** Information theory, machine learning, deep learning, data mining, pattern recognition, probability and statistics theory, time series analysis, causal analysis, learning theory, feature extraction theory.

2. **Recognition, understanding, and thinking:** Computer vision, image recognition and search, 3D information processing, behavior recognition, multimodal recognition, emotion understanding, intention estimation, natural language processing, speech and music information processing, medical information processing, big data

3. **Content generation:** Natural language description of images and videos, image generation from natural language, conversational systems capable of chatting with humans, discovery of interesting phenomena in the real world and article generation

4. **Intelligent robots:** Reinforcement learning, imitation learning, meta-learning, trajectory optimization, motion planning, task planning, continual learning, sim-to-real, fast inference, SLAM, 3D reconstruction, learning at the edge, interaction with humans

Integration of CV, CG and ML

Generation of realistic novel object images

Automatic sentence generation by recognizing images

Trajectory optimization to find diverse solutions

A silver car parked in a residential street.

A brown horse standing in a lush green field.

Non-Euclidean neural network
Our research group aim to develop biohybrid systems that integrate functional biomaterials with artificial devices, such as biohybrid robots powered by skeletal muscle tissues that works flexibly and quietly, covered by living skin tissue with human-like appearance and function, and enabled by sensor cells that can detect target materials with high sensitivity and selectivity. Our approach involves various disciplines, including mechanics, informatics, micro/nano technology, bioengineering, and material sciences. Personnel interested in multidisciplinary research, with any of these abovementioned backgrounds, are warmly welcomed to join us.
Bio-intelligence Systems Lab.
http://www.ne.t.u-tokyo.ac.jp/index-e.html

**Research Fields**: The Bio-Intelligence Systems Lab aims to understand the brain in engineers’ manner and to create next-generation brain-like computation systems. Our research field is interdisciplinary, ranging between informatics, engineering, and neuroscience. To reveal how intelligence, consciousness, and fine arts emerge, we investigate neural computation at various scales, ranging from dissociate culture of neurons on a petri dish, the rodent brain, and the human brain. We develop novel experimental methods and equipment, such as high-density microelectrode arrays and behavioral assays, to obtain large-scale experimental data, and make full use of state-of-the-art machine learning and artificial intelligence to characterize and analyze our own data. Based on these experiments, we reveal the dynamics of neural activities and construct mathematical models of the brain.

**Research Examples**: