



Master's and Doctoral Programs in

Neuroscience

Degree Programs in Comprehensive Human Sciences, Graduate School of Comprehensive Human Sciences, University of Tsukuba

Master's / Doctoral Programs in Neuroscience

Graduate School Guide 2024-2025

Welcome to the Master's and Doctoral Programs in Neuroscience

Our master's and doctoral programs in neuroscience started in April 2020 as a graduate level course in neuroscience that meets international standards. Neuroscience is not just a science that simply describes and understands the structure and function of the brain today. Targeting a wide range of issues from unraveling the movement of the mind to diagnosing diseases, developing treatment measures, and understanding complicated human relationships and the principle of how society should be, research in neuroscience has been promoted that integrates the methodology of different scientific fields. Solutions to those issues are highly expected by society, and in that context, overseas universities and research institutions have already offered expert training courses in the study of neuroscience and produced a large number of human resources.

Now, in order to meet the social need to develop experts in neuroscience, the University of Tsukuba has decided to promote the development of human resources with international competitiveness in the field of neuroscience based on a wide range of science fields by assembling not only researchers from basic neuroscience, psychology, and behavioristics but also researchers and clinicians specialized in clinical medicine (psychiatry), clinical disability studies, biology, agriculture, veterinary medicine, and engineering.

The programs focus first on the development of human resources with high skills in research, language, and communication for conducting world-class research and delivering the results globally. At the same time, many internships at companies, as well as seminars, gatherings, and other meetings of domestic and overseas researchers are also provided for building a carrier path after completing the master's and doctoral programs.

All of you who intend to become an expert in neuroscience need curiosity and a positive mind. You do not have to worry about the lack of experience and knowledge. You can always acquire them through the education process in the master's and doctoral programs in neuroscience. We are looking forward to the participation of those who are interested in neuroscience.

Master's and Doctoral Programs in Neuroscience Program Leader between FY 2024 and FY 2025 **Takeshi Sakurai**





The only graduate school programs granting a master's degree and a doctoral degree in neuroscience in Japan

Cellular and Molecular Neuroscience

B Systems Neuroscience Cognitive and Behavioral Neuroscience Clinical and Translational Neuroscience

Thoroughly fundamental education covering overall neuroscience

Introduction to Neuroscience A, B, C, D (All compulsory)

Lectures covering the basic knowledge of neuroscience using the *Principles of Neural Science* (Kandel et al., 5th ed., 2013) as a textbook. Neuroscience Laboratories A, B, C, D (Elective compulsory) Hands-on practice in neuroscientific research by assigning students to a laboratory for a week

Developing abilities in communication using scientific English and logical thinking throughout the year

Research Proposal Writing in English I (Compulsory) and II (Elective) English Journal Club I (Compulsory), II (Elective) Abilities in scientific English and verbal presentations in English are developed. Advanced Scientific Research Proposal in English I (Compulsory) and II (Elective)

Abilities in the writing of an English paper and doctoral dissertation, as well as logical thinking for preparing a research plan, are developed through English skills.

Providing opportunities to learn practical and advanced research in neuroscience outside the laboratories

Neuroscience Research Seminar

I (Compulsory) and II (Elective) Research seminars provided to study the most advanced

research in neuroscience.

Advanced Neuroscience Seminar I and II (Compulsory) and III (Elective)

Students attend research seminars and academic symposiums held at the university and outside it, including overseas, to study the trends in neuroscience by themselves.

First Year of Master's Program

- Neuroscience Professional Career Development
- Introduction to Neuroscience A (Cellular and Molecular)
 Introduction to Neuroscience B (Systems)
- Introduction to Neuroscience D (Systems)
- Introduction to Neuroscience C (Denavioral and Cognitive)
- Research Proposal Writing in English I
- English Journal Club 1
- Neuroscience Research Seminar I
- Neuroscience Laboratories A, B, C, D (Elective required)
- Neuroscience Thesis Research I and II
- Interdisciplinary Foundation Courses
- Research Ethics as Common Subjects for Graduate School

Translational Neuroscience Internship

Second Year of Master's Program

Qualification Test

- Neuroscience Thesis Research III and IV
- Research Proposal Writing in English II
- English Journal Club II
- Neuroscience Research Seminar II

Master (Neuroscience)

First Year of Doctoral Program

- Career Planning, Researcher Ethics, and TF Training Seminar
- Advanced Scientific Research Proposal in English I
- Advanced Neuroscience Seminar I
- Neuroscience Dissertation Research I and II

Qualification Test I

Advanced Neuroscience Internship

Second Year of Doctoral Program

- Advanced Neuroscience Seminar II
- Neuroscience Dissertation Research III and IV
- Advanced Scientific Research Proposal in English II

Qualification Test II and III

Third Year of Doctoral Program

Neuroscience Dissertation Research V and VI
 Advanced Neuroscience Seminar III

Doctor (Neuroscience)

Master's Program **Doctoral Program** Neuroscience Thesis Research Neuroscience Dissertation Rese of the First Determine a theme for a master's thesis under the Determine a theme for the doctoral dissertation instruction of the academic advisor. research and conduct a literature search and Search and study the literature of preceding basic preliminary research under the instruction of the research related to the theme. academic advisor. Submit a provisional theme and keywords by the end of September. Conduct preliminary experiments and research as (→ Decision on the theme of QE1) needed. Pursue research for the master' thesis under the Autumn Sem of the First Pursue research for the doctoral dissertation under instruction of the academic advisor. the instruction of the academic advisor. Work on the Prepare for a research qualification test for the tasks for QE1. master's thesis. QE1: Prepare a report on an individual theme assigned during October and submit the report by the end of January. (The written report is examined by the academic advisor, and a pass/fail decision is made by the Make a poster presentation (in English) about the concept of the master's thesis research. Oualifying Examination Committee for Doctoral Dissertation Research.) Neuroscience Thesis Research Neuroscience Dissertation Research Pursue research for the master' thesis under the Pursue research for the doctoral dissertation under instruction of the academic advisor. the instruction of the academic advisor. Work on the Take a research qualification test for the master's tasks for OE2. thesis. OE2: Submit a review paper that leads to the introduction of the doctoral dissertation by the end of August. Submit the Abstract, Introduction, and Methods sections of the master's (The written review paper is examined by the peer-review committee, and a pass/fail decision is made by the Qualifying Examination Committee for Doctoral Dissertation Research.) thesis in a format that is compliant with the Journal of Neuroscience by the end of June. (The written submissions are examined by the primary advisor and the secondary advisors and a pass/fail decision is made.) Give an oral presentation at the end of September. ence Thesis F Neuroscience Dissertation R Work on preparing the master' thesis under the Work on research for the doctoral dissertation and preparation instruction of the academic advisor and submit the for an English paper for submission to an international journal thesis. under the instruction of the academic advisor. Prepare for the final examination of the master's thesis. Work on the tasks for OE3. QE3: Submit the manuscript of the English paper by the end of February. (The manuscript is peer-reviewed by the primary advisor and the secondary advisor, and a pass/fail decision is made by the Qualification Examination Committee for Doctoral Dissertation Research.) Steps for Master's Thesis Examination Neuroscience Dissertation Research Work on research for the doctoral dissertation and 1. Submit the master's thesis in January. preparation for an English paper for submission to an 2. Final examination of the master's thesis international journal under the instruction of the Yea Give a presentation at a meeting attended by all research supervisors of the academic advisor. master's and doctoral programs in neuroscience and participate in a question and answer session followed by a final examination by the primary advisor and the secondary advisor (question and answer session). 3. Give a presentation at an open meeting for the presentation of the master's thesis research. Neuroscience Dissertation Research Complete the doctoral dissertation under the instruction of the academic advisor. Prepare for the final doctoral examination and the

Steps for the examination of the dissertation (When the student acquires the doctoral degree at the end of the third year)

final public presentation of the doctoral dissertation.

- 1. Submit the dissertation for a preliminary examination by the fourth Thursday of September.
- The preliminary examination meeting is held in October. (The dissertation is peer-reviewed by the primary advisor and the secondary advisor, and a decision on whether to submit the dissertation or not is made by the Faculty Meeting for Master's/Doctoral Program in Neuroscience)
- 3. Submit the dissertation for the main examination by the end of November
- 4. Take the final examination by the end of January.

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Tri-Institutional Neuroscience Graduate Seminar stablishment and Opening of TiNGS



National Taiwan University



Monash University, Malaysia

The Online Exchange Project Conducted among Three Graduate Schools' Organizations for the Neuroscience Field in East Asia

FY 2021



There was no restriction in the content and composition of the presentations, including the plan, progress, and result of research for a master's thesis or a doctoral dissertation. Three-minute presentation (FlashTalk) + two-minute question and answer session (Zoom) The chair was rotated by the student organizers of the three universities.

- On December 10 (the final day), education programs of the three universities were introduced, and cultural exchanges about students' lifestyles were promoted.
- FY 2022
 - $\cdot Research$ exchange for three days on May 13, 20, and 27.
- FY 2023
 - •Research exchange for three days on May 12, 19, and 26.



It was challenging to answer questions in English, but I was happy that people were interested in the content of my presentation. There were many questions and opinions during the free discussion, and I've made friends with whom I continue to exchange ideas, making me feel that my world has expanded. I have always had a strong aversion to English, and presenting my research in English seemed like a daunting task. However, I was able to finish my presentation enjoyably, thanks to the warm and welcoming atmosphere.

Graduate School of

Comprehensive Human Sciences

FY 2021

FD Award

INTERNATIONAL BRAIN

SANIZATION

Participation in the IBRO School

What is IBRO?

It is the global association of neuroscience societies established in 1961 (more than 90 countries and regions).
 Training, education, research, outreach, and engagement activities
 It issues the academic journals *Neuroscience* and the *IBRO Neuroscience Reports*.
 It promotes and supports the neuroscience field globally. →Providing support for opening a school for developing

It promotes and supports the neuroscience field globally. →Providing support for opening a school for developing young researchers.

 Two students participated in the IBRO School held at Monash University Malaysia on October 10–23, 2022

A lecture along with hands-on practice in advanced/latest technologies in the neuroscience field and a discussion/workshop on bioimaging and proteogenomics was delivered.

• For the 2024 academic year, held in August at National Taiwan University

National Taiwan University Summer School

In the 2023 academic year, 5 students participated in a neuroscience program. On the final day, all participants presented posters at the Taiwan Society for Basic Neuroscience.



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can accept graduate students for the master's and doctoral programs Faculty members with a can accept only graduate students for the master's program.

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Subject of Research

Location of

Institute of Medicine

Psychiatry and Neurology Group 01

In today's society, there are many patients suffering from diseases wherein the whole aspect has not yet been elucidated, such as depression, neurodevelopmental disorders, and dementia. To clarify the symptoms caused by the interaction between the brain and feelings, it is necessary to have deep knowledge and an understanding of both biological aspects based on pharmacology, physiology, molecular genetics, neuroimaging, and the phycological aspects based on psychopathology and phycology. Our research group works to elucidate the etiology of mental illness and to develop better treatments every day. In this, Tsukuba is conveniently located 45 minutes from Tokyo and is well-balanced among science, nature, and culture, so let's work together on the research that will lead to the development of new psychiatric care.



Miho Ota



Institutes of Medical Sciences Building

Cultured cells

Kiyotaka Nemoto Associate Professor

02 Anatomy and Neuroscience Group

For neuropsychiatric disorders, including integration disorder syndrome and autism disorder, we have no definitive treatment based on the understanding of pathogenesis and pathophysiology; therefore, many patients with the disorders are affected by the symptoms and experience social maladjustment. Behind those disorders, abnormalities in neuronal morphology and functions are found, which are caused by a combination of genetic and environmental factors. We are conducting research focusing on the themes below with the aim of elucidating the pathogenesis and pathophysiology of neuropsychiatric disorders at the molecular level for treatments and prevention.

- 1. Mechanisms of intracellular transport in neurons
- 2. Mental illnesses based on the disruption of intracellular transport machinery
- 3. Neuronal abnormalities caused by immunological abnormalities
- 4. Analysis of the mouse model of mental illnesses





Suguru Iwata Assistant Professor



Assistant Professor

Tetsuya Sasaki Momo Morikawa Assistant Professor

Cognitive and Behavioral Neuroscience Group 03

In our daily lives, humans evaluate values of actions or items. My research aims to understand the neural mechanism of value-based decision makings in humans and animals. Neuroeconomics is a cutting-edge interdisciplinary research that combines neuroscience and microeconomics. For example:

·Why is water delicious when you are thirsty?

·Why do you prefer coca cola than Pepsi?

·Gambling makes you nervous, right?

We examine brain functions related to such things. We use humans and their model animal, the macaque monkey, and perform cognitive behavioral tasks to investigate how the brain's activities related to decision-makings occurred depending on the level of needs such as thirst or hunger. In addition, by manipulating brain activity, we are investigating the effects of observed brain activity on behavior. By examining brain's normal functions and abnormalities, we hope to understand a mental illness, such as depression.



Hiroshi Yamada

Associate Professor

Neurophysiology Group $\mathbf{04}$

Cardiovascular and respiratory regulation by the central nervous system plays a crucial role in human homeostasis. Disorders of this regulatory system cause serious problems in the living body. Despite that fact, many of the mechanisms remain unknown. In order to open those black boxes, we are approaching the electrophysiological mechanisms of cardiovascular and respiratory regulation by the central nervous system using in vivo preparation and the in situ preparation (arterially perfused preparation) of rodents. At present, we are especially analyzing (i) the chemosensitive mechanisms in the cardiovascular center, (ii) the relationship between the cardiovascular and the respiratory centers, and (iii) diseases that are induced by disorders involving these systems.



Research Information

Systems physiology group 05

We flexibly adjust our behavior to adapt to the dynamically changing environment in a complex manner. The neuronal mechanisms underlying these adaptive behaviors, acquired through evolution, remain unclear. Our laboratory aims to understand the neural mechanisms of these adaptive behaviors at the system level from sensory input to behavioral execution and contribute to the medical field by elucidating pathological conditions such as psychiatric and neurological diseases in which adaptive behaviors are impaired. Therefore, we examine human and monkey behaviors by using cognitive tasks and analyzing neuronal activity during the task at the millisecond time resolution in monkey.

Currently, our focus is on the following themes:

- (1) The effects of breathing on cognitive functions.
- (2) Neural circuits underlying social behavior.
- (3) Neural mechanisms of voluntary breathing.

IIIS

Molecular Behavioral Neuroscience Group 06

Neuropeptides play a variety of roles in the regulation and control of the central nervous system and are involved in a variety of physiological functions. We have identified novel neuropeptides and defined their functions to elucidate unknown physiological functions and the functional mechanisms. By handling a wide range of approaches from neuroscientific ones to ones for clinical application, we are currently conducting research on the themes as follows:

1. Deciphering the neuronal mechanisms that regulate sleep/wakefulness states 2. Revealing neuronal pathways that regulate social behavior and social distance 3. Analyzing the neuronal mechanisms that control regulated hypometabolism







Professor

Takeshi Sakurai

Yuki Saito

Assistant Professor

Jun Kunimatsu

Assistant Professor



Lazarus/Oishi Lab 07

The investigative focus of our laboratory is the cellular and synaptic basis by which the brain regulates sleep and wakeful consciousness. Our experiments seek to investigate the activity of defined sets of neurons with neurobehavioral and electroencephalographic outcomes in behaving animals by manipulating neural activity (optogenetics, chemogenetics or optopharmacology) in conjunction with recording of the neural activity or in vivo imaging (e.g., fiber optic endomicroscopy). So far, we have made key contributions to our understanding of sleep/wake behaviors, for example, why coffee wakes us up, why we fall asleep when bored, or how REM sleep loss increases the desire for junk food. In addition, we are conducting research by investigating the function and control mechanism of sleep using mice engineered to sleep very little.



Yo Oishi Associate Professor

Michael Lazarus

Professor

Sakiko Honjoh 08

When we stay awake longer, we get increasingly more drowsy and thus we sleep longer. And after the cortical region is active during waking, the region sleeps deeper than other inactive areas of the brain. In order to understand the interaction between the sleep and waking states, we have been conducting research using mice that sleep after persistent waking states in order to investigate the changes in neural firing and gene expression occurring in the brain during the sleep. In addition, we focus not only on the sleep and waking states on an individual basis but also on slow wave activity, which is the best marker for the need for sleep and plays an important role in memory consolidation





Master's and Doctoral Programs in Neuroscience 6



😐 Katsuyasu Sakurai

Living organisms, including Homo sapiens, live by adapting to inner states (body, physiological state, mental states, etc.), environments, and stimuli that change every second. And I think what underlies the adaptation is "Fullness." The "Fullness" may be translated into appetite. Please imagine a cup. Living organisms have cups of various sizes inside a larger cup labeled *survival needs*, and they try to fill those cups through their actions or physiological responses as needed. These cups are not independent, but they affect each other through behavior and physiological responses to determine the sizes or the amounts that fill them. Our desire is to elucidate how those cups are ifiled, that is, the true identity and mechanism of "Fullness," the root of the various vital activities, particularly focusing on the central nervous system.

10 Masanori Sakaguchi

Because of technological innovations in neuroscience, it has been elucidated that memories can be decomposed into the activity patterns of neuronal ensembles that carry information. For example, some activity patterns of neuron cells that regulate spatial information are observed during sleep. This recreation of daytime experiences during sleep is important for memory consolidation, and it is thought that dreams are created in this process; however, there are still many things unclear about how it brings about change in neuron cells and affects long-term memory. Our group aims to overcome these challenges using the latest bioluminescence imaging and genetic technologies. Our aim is to use the outcomes of fundamental research for the development of treatment methods to overcome memory problems.

11 Takashi Abe

We have been conducting research with the aim of understanding and manipulating human cognition and emotion in relation to sleep on the three topics as follows: (1) Understanding the psychological functions of sleep: currently, we especially aim for the elucidation of the role of REM sleep in emotion and decision-making during waking. In addition, we are working on research on mind wandering following poor sleep. (2) Estimation of cognition and emotion in relation to sleep: we are conducting research on methods for estimating decreased attentiveness due to poor sleep from the movements of the eyes and eyelids, as well as methods for estimating emotions in dreams during sleep using electroencephalographic outcomes. (3) Manipulation of sleep by noninvasive stimulation: we have found a new method for facilitating sleep onset using acoustic stimulation. Currently, we are working on the elucidation of the principle and examination for practical applications of the method. In addition, we are also trying to manipulate the phycological function of sleep and emotions in dreams using noninvasive stimulation, such as olfactory stimulation and acoustic stimulation.



Takashi Abe Associate Professor



Katsuyasu Sakurai

Masanori Sakaguchi

Associate Professor

Associate Professor



Institute of Human Sciences

12 Saho Ayabe-Kanamura

Perception is based on individual experience (memory). Whether we like or find an object pleasant often depends on how the object is perceived. Perception is also strongly influenced by context. The research goal of our laboratory is to approach the elucidation of the mechanism of human perception through the various sensory modalities (especially, olfaction and taste sensation), using perceptual learning, memory, hedonics, set, context, and inter-sensory interaction as keywords.



• Saho Ayabe-Kanamura

Professor

Pasqualotto Achille

Experimental psychology and neuroscience, traditionally have investigated sensory modalities in isolation (vision on its own, audition on its own, touch in its own, etc.). However, in the "real world" all our senses work at-the-same-time (or multisensory). All this information is processed in parallel by the bran to build a representation of the external world. Our goal is investigating how this process occurs.



Pasqualotto Achille Associate Professor

4 Kazuo Yamada

The field of behavioral neuroscience is trying to clarify the mechanisms of human and animal behaviors based on biology and, particularly, neurology as one area of psychology to understand the mechanism of the human mind (spirit). This field especially focuses on changes in human and animal behaviors from experience, such as memory and learning. Specifically, we are conducting research using rats with interest in the following:

- 1. Development of methods for measuring the memory and learning ability of animals
- 2. Effects of brain lesions, neurotoxin treatment, and drug treatment on the performance of memory and learning tasks
- 3. Development of animal models of neural degeneration diseases that include memory disorders
- 4. Involvement and mechanisms of neurotransmitter and receptor systems in the memory and learning processes



Kazuo Yamada

15 Aki Takahashi

Each of us has a different personality. There are also large individual differences in many behavioral phenotypes, such as timidity, aggression, and stress susceptibility in the mouse (*Mus musculus*). Our laboratory has been conducting research to understand the biological mechanisms that produce these individual differences in social behavior, especially focusing on aggressive behavior, from a wide perspective, including neural circuits, immune system, microbiota, and genetic basis. Recently, we have conducted research that especially focuses on the behaviors of aggression among the social behaviors.



Aki Takahashi Associate Professor



Our laboratory studies the social behaviors of aggression, sexual behaviors, and social recognition to understand the neural and neuroendocrine mechanisms of those behaviors from the genetic, molecular, anatomical and physiological levels. We are trying to elucidate the neural mechanism underlying the formation and maintenance of sociality by combining detailed behavioral analyses with the neuroscience techniques of gene knockdown, optogenetics, and chemogenetics using the mouse model.

17 Katsuo Yamanaka

Our laboratory has been conducting research on geriatric clinical psychology mainly targeting people with dementia and their caregivers on the concept of neuropsychological rehabilitation. We place particular importance on the translation from our studies into practice. We welcome students and researchers who are interested in the themes as follows:

- 1. Development of psychological and social approach to people with dementia
- Group activity programs, such as a cognitive approach and a reminiscence method
 Individual intervention for the behavioral and psychological symptoms of dementia by functional analysis
- Development of assessment methods for the cognitive function, mood, and behavior of people with dementia
- 3. Research on behavioral change in social attitudes toward people with dementia

18 Ami Sanbai

People with deficits in the processing of spoken and/or written language, including the understanding of language and expression, have a variety of difficulties in school, work, and daily life and so need effective support, instruction, and training. To provide such support, instruction, and training, a deep understanding of the symptoms and causes is important. We have been conducting research with the aim of clarifying the underlying mechanisms of deficits in language processing using cognitive neuropsychological approaches to lead the research to scientific evidence-based support, instruction, and training by focusing on the following:

Research on the underlying mechanisms of deficits in language processing, including the understanding and expression of language, reading, and writing

Development of tests to detect symptoms and cognitive characteristics Development of effective support, instruction, and training based on symptoms and cognitive characteristics

19 Shinji Okazaki

Our laboratory has mainly been exploring the cognitive and developmental characteristics of children with neurodevelopmental disorders (intellectual deficit and developmental disorders), including attention-deficit hyperactivity disorder (ADHD), as well as methods for assessing and supporting them. Mainly targeting visitors seeking for educational consultation, we have been conducting fundamental research centering on the performance of psychological tests and the measurement of biological reactions during the tests (EEG and NIRS) and clinical research on the assessment of cognitive characteristics using intelligence tests and cognitive tests, as well as support based on the assessment in instructive situations. Students belonging to our laboratory are also pursuing their own research while engaging in fundamental or applied research activities. That is, we might say that our laboratory features activities for understanding and supporting people with neurodevelopmental disorders through fundamental and applied research.



Bidg.

Mariko Nakata

Assistant Professor



Katsuo Yamanaka

Associate Professor

Ami Sanbai

Assistant Professor

Cooperative Graduate School

¹⁹ Sunao Iwaki

In recent years, noninvasive techniques to measure and visualize human brain activity have made remarkable progress. Based on the complementary use of the neuroimaging techniques including EEG and functional MRI to precisely measure and analyze neural activities in the human brain corresponding to cognitive processing, we have been conducting research to model the perceptual, cognitive, and behavioral characteristics of the living human. These techniques can also be used to quantitatively evaluate our cognitive and/or behavioral performance in the real world by integrating them with VR environements and simultaneous recording of physiological and behavioral data from multiple participants. Our research laboratory is located at the National Institute of Advanced Industrial Science and Technology (AIST); students take classes at the University of Tsukuba and carry out their research at AIST (Cooperative Graduate School Program).



• Sunao Iwaki

Professor (Cooperative Graduate School)

20 Yuji Takeda

A scientific understanding of user characteristics is important in order to develop better products and services. In our research laboratory, we investigate human attention, cognition, and emotion by using event-related brain potentials (ERPs). ERPs are temporal variations in the brain potentials that reflect information processing in the brain, and they allow us to estimate when and how deeply the information is processed, which cannot be estimated simply by behavioral indices. Our studies are conducted not only in an experiment room to investigate basic cognitive functions but also in simulated and real situations to develop products and services. Our research laboratory is located at the National Institute of Advanced Industrial Science and Technology (AIST); students take the classes at the University of Tsukuba and carry out their research at AIST (Cooperative Graduate School Program).



Yuji Takeda Professor (Cooperative Graduate School)

21 Shinya Yamamoto

The brain reconstructs the external world by collecting multiple sensory signals. Our laboratory aims to comprehensively understand neural information processing in perception and cognition from the macro to micro levels through psychological experiments on humans and physiological and pharmacological experiments on animals. Currently, we focus our research on how multisensory signals are integrated and segregated in the brain, how they represent spatial and temporal information in information processing, and how self-perception and awareness are formed. We are also searching new parameters for information processing in the brain, including local brain temperature, and developing new technologies. Our research laboratory is located at the National Institute of Advanced Industrial Science and Technology (AIST); students take the classes at the University of Tsukuba and carry out their research at AIST (Cooperative Graduate School Program).



Shinya Yamamoto Associate Professor

(Cooperative Graduate School)

23 Kentaro Katahira

Our laboratory is engaged in research to analyze human and other animal behaviors using computational models that represent computational processes in the brain and other statistical models. In particular, we analyze behavioral data using reinforcement learning models and neural circuit models to understand the mechanisms and functions of behavior and to capture individual characteristics. We also conduct theoretical work on computational modeling and statistical modeling methodologies. Furthermore, we are trying to apply such modeling techniques to the optimization of health care services. Our research laboratory is located at the National Institute of Advanced Industrial Science and Technology (AIST); students take classes at the University of Tsukuba and carry out their research at AIST (Cooperative Graduate School Program).



Kentaro Katahira Associate Professor (Cooperative Graduate School)

Students' Voices

Questions

Why did you apply for the master's or doctoral programs in neuroscience?
 What kind of research are you conducting now?
 Please let us know what impressed you in the lectures and hands-on practice of the master's and doctoral programs in neuroscience?
 What is your goal for the future? (Your future dreams or ambitions are also acceptable.)



Koshiro Mitsui

Academic advisor/ Aki Takahashi, Associate Professor College of Psychology, School of Human Science, University of Tsukuba Comprehensive Human Science Group, Graduate School of Comprehensive Human Science, University of Tsukuba Master's Program in Neuroscience I wanted to continue research in graduate school by carrying on my research theme from undergraduate studies. And another big reason is that I was primarily interested in the neurobiological mechanism of behaviors.

I have been researching the cerebral mechanism of aggression in mice using optogenetics, a technology to manipulate neural circuits. Most recently, I have been researching the dynamic state of neural activity during aggression using calcium imaging. In addition, I have been exploring the relationship between aggression and intestinal bacterial flora as part of research on the brain-gut correlation that has been attracting great attention in recent years, mainly engaging in bioinformatics, including metagenomic analysis.

I had classes that offer hands-on practice in a laboratory different from the one that I belong to for a certain period, which was good because I could experience experiments that I did not usually conduct. I think it is really recommended to visit and see many laboratories in order to enrich your knowledge.

4 1. To refine my skills. 2. Not to forget the original purpose.



Kento Sawai

Academic Advisor/ Yuji Takeda, Professor Interdisciplinary Humanities, Faculty of Letters, Kansai University Comprehensive Human Science Group, Graduate School of Comprehensive Human Science, University of Tsukuba Master's Program in Neuroscience I had studied a wide scope of psychology during my undergraduate years, and I wanted to study the brain that controls the human mind as the center before devoting myself to psychology, so I applied for the master's program in neuroscience. I am now receiving guidance from the National Institute of Advanced Industrial Science and Technology (AIST) using the Cooperative Graduate School Program. I am working on my research surrounded by researchers who pursue not only fundamental research but also applied research. I think the University of Tsukuba is one of the few universities where students can study experimental phycology while holding discussions with a wide range of researchers in Japan.

In the master's program, I conducted an online experiment for 1,000 participants under the theme of habitual exercise and cognitive function. In the doctoral program, I am going to change the theme and conduct research on individual differences in the learning speed of device operation.

Neuroscience Laboratories C was the most impressive. In the subject, students work on experiments and hands-on practice in laboratories other than theirs for a week. Though I was conducts research on humans, I joined a laboratory that conducts research using mice. It was a hard time because I experienced many things that were completely different from what I usually did, but the largest benefit was that it became easier to read papers on research using mice after joining it.

First of all, I aim to receive a doctoral degree in three years. And I want to go abroad for research during the doctoral program. Irrespective of whether I continue research or choose another course, I would like to open up a way to my destination by myself.



I want to conduct cross-disciplinary research in neuroscience, ergonomics, and design. Experience in receiving lectures and hands-on practice from researchers in neuroscience and ergonomics and having exchanges with teachers and students from different areas on a daily basis, which can be gained through the program in neuroscience offered by the University of Tsukuba, is a great advantage for me in pursuing cross-disciplinary research.

(2) Promotion of international communication

Communication with researchers from various countries is an indispensable competence for pursuing research. I think the competence for international communication in my specialized field, such as writing papers and oral presentations at international institutes in various languages, including Japanese and English, will be developed through the master's and doctoral programs in neuroscience.

(3) The title "Master's and Doctoral Program in Neuroscience" is highly approved internationally

As I am a foreign student studying in Japan, I experience inconvenience in many aspects when searching for research fields. In particular, programs related to cognitive science and neuroscience are inevitably distributed into the fields of medicine, integrated human studies, engineering, and other areas. But I think neuroscience is recognized as a standard area of the sciences internationally. Therefore, the fact of studying under the master's and doctoral programs in neuroscience gives me the advantage of an easier explanation of the background of my research when applying for jobs at universities or research institutions after completing the programs.

I want to mount a GPS navigator that indicates a route to a destination a function supporting the acquisition of a cognitive map, which represents the user's mental geography. I am designing an AR navigator that effectively supports the acquisition of a cognitive map using cognitive neuroscientific methodology, including electroencephalograms and the measurement of eyeball movement.

What impressed me the most was the earnest support provided by the teachers and students in the programs. In my cross-disciplinary research, it is not enough to consult my academic advisor about what I cannot understand. At first, I was afraid to ask the people in other laboratories for help because they looked busy, but I found that the teachers were very earnest in helping students, so I got the courage to consult them. They took time to answer my questions, and my classmates actively gave me advice. If you have any questions in the programs, please don't hesitate to ask and do not be afraid of rejection.

I aim to become a researcher who can achieve results with not only academic but also social and economic impacts through a cross-disciplinary approach that applies the knowledge of neuroscience and ergonomics to mapping cognition. The book titled *Amusing Ourselves to Death* (Neil Postman, Viking Penguin, 1985) says that the development of new technologies will provide pleasure and convenience but, at the same time, change people's environments and interactions. There are many cases in which the development of technologies is incorporated into nature is impaired because of the development of technologies, and many people consider it the outcomes of technologies themselves. However, I think that the development of human abilities and, therefore, in developing new technologies, not only is efficiency pursued but also interaction for enhancing human abilities should be designed in order to empower human abilities. As a researcher, I would like to work on a wide range of research from fundamental ones to elucidate the mechanism of human cognition to applied ones through joint research and cooperation with companies to devote myself to the development of turnan abilities.



Riko Mizukami

Academic Advisor/Tadachika Koganezawa, Associate Professor Doshisha University Faculty of Psychology Comprehensive Human Science Group, Graduate School of Comprehensive Human Science, University of Tsukuba Master's Program in Neuroscience I had heard that the master's and doctoral programs in neuroscience would accept a wide range of students from many fields since the time of Kansei, Behavioral and Brain Sciences, which is the predecessor of the program. I studied psychology during the four years of undergraduate study and was fascinated with clarifying emotions and behaviors using neuroscientific methods, so I decided to take an entrance exam for the master's program in neuroscience, which accepts liberal arts students and offers an environment for learning the basics of neuroscience.

I am conducting research on stress-induced respiratory responses in the Koganezawa Lab now. The physiological functions of heartbeat, blood pressure, and respiration are stabilized by homeostasis. As these functions show specific responses to stimuli like motion and emotion, I am exploring which region of the brain regulates the functions and which route is used to convey the stimuli.

S Last year (2022), I participated in the IBRO School held in Malaysia as part of an internship for expert research in neuroscience. (The picture was taken when I visited the laboratory of Monash University where the IBRO School was held, and an experiment using a confocal laser scanning microscope was demonstrated.) I lived together with young researchers in neuroscience who came from Southeast Asian countries and participated in various classes, lectures, and discussions. I learned the research techniques and methodology of other laboratories, which I could not have been able to experience normally, and I saw the latest equipment and antibodies used for staining shown by a company. Graduate school students may often attend academic meetings and lecture meetings, and for me, participation in an overseas exchange program like this made me broaden the view of my research and provided me an opportunity to think of my future

I want to begin something new. I have enjoyed breeding tropical fish for two years and have become able to keep them stably. So, I want to try new species of tropical fish.

Career Path

Master's Program

- ·Nihon Koden Corporation
- ·Hitachi, Ltd.
- ·Deloitte Tohmatsu Venture Support Co., Ltd.
- ·JAPAN TOBACCO INC.
- ·Doctoral Program in Neuroscience

Doctoral Program

University of Tsukuba (Researcher)
 Kyoto University (Researcher)

[11]

Career

Path





Zhang Xiaoyu

Academic Advisor/ Sunao Iwaki, Professor Department of Applied Psychology, Faculty of Educational Technology, Jianghan University (China) Graduate School of Comprehensive Human Sciences, University of Tsukuba Master's Program in Kansei, Behavioral and Brain Sciences

Facilities

These are facilities used for research activities, classes, and hands-on practice in the master's and doctoral programs in neuroscience. Some faculty members have a laboratory in facilities other than the Laboratory of Advanced Research D on the main campus of the University of Tsukuba (See the "Research Information"). Graduate school students conduct research mainly in the facility where their laboratories are located while attending classes and hands-on practice sessions visiting various facilities, including the Laboratory of Advanced Research D.







University of Tsukuba Laboratory of Advanced Research D





University of Tsukuba Central Library

University of Tsukuba International Institute for Integrative Sleep Medicine (IIIS)





Tsukuba City



National Institute of Advanced Industrial Science and Technology (AIST)







Entrance Examination

Master's Program

General Entrance Examination

General Entrance Examination

Conducted between

January and February

8 students

Number of Program Admissions

Number of Program Admissions

2 students

(Desired students)

The desired students shall have high interest in specialized research regarding comprehensive brain functions and behaviors, the mind, and mental disorders. It is desirable but not always essential that students have received undergraduate education, including classes in neuroscience, psychology, disability science, biology, and basic medicine.

(Selection policy)

The entrance examination shall be composed of written and oral examinations by which linguistic skills, knowledge in the area of expertise, and motivation and qualification for learning shall be comprehensively evaluated.

Doctoral Program

General Entrance ExaminationNumber of Program AdmissionsConducted in August4 studentsGeneral Entrance ExaminationNumber of Program AdmissionsConducted between
January and February1 students

(Desired students)

It is desirable for applicants to have majored in neuroscience, psychology, disability science, biology, or basic medicine in the master's course. Applicants must have achieved a certain level of proficiency in the master's course and have the ability and desire to become independent researchers after completion of the course.

(Selection policy)

The entrance examination will be conducted through an oral examination. The following qualities will be emphasized in the selection process: (1) content and understanding of the research conducted in the master's course, (2) research planning ability, and (3) presentation ability.

For more information, see the blow:

https://www.ap-graduate.tsukuba.ac.jp/ course/chs/#course-art



The admission briefing will be held online in June and November every year.

Request for sending past exam questions



If you would like us to send the past exam questions for the master's program, please request it using the form below: (We cannot send past exam questions overseas.)

https://www.neurosci.tsukuba.ac.jp/request.html





Degree Programs in Comprehensive Human Sciences, Graduate School of Comprehensive Human Sciences, University of Tsukuba

Master's / Doctoral Programs in Neuroscience

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