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Subject	Credit	About the course
Mind Sciences 心の科学	2	In this lecture, we conduct omnibus lecture series of faculties in the various fields of neuroscience, behavioral sciences, and computational theory. Participants will attempt to obtain a wider perspective on their own field by gaining a wider point of view bridging understanding across the nervous, behavioral, and social levels that form the bases of the sciences of the mind.
Research Presentation Research Presentation	2	Presenting a talk or poster in English at a scientific organization or research society allows one to show their research results, and is important as a means of exchanging information. This lecture advises students on how to best understand the gist of sample research papers and accurately transmit the information to someone else, from the point of view of a scientist or engineer. Participants will select a representative example of literature in their own fields, will understand the gist of the paper with guidance from the lecturer, and will present the paper themselves. They will then receive advice on how to improve. Advice is given on such topics as creating slides, establishing points, presenting in English, and finding points to question in the presentations of others. Therefore, students participate not only as presenters, but from the standpoint of those listening to and discussing the presentation.
Research Ethics 研究者倫理	2	Scientific development relies on trueness, trust and fairness of research practice. Scientific misconduct -violation of these norms- hampers the sound development of science. We discuss scientific misconduct and questionable research practice through case study and cultivate research ethics as practical wisdom.
Advanced Mind Sciences Ⅰ 心の科学先端セミナーⅠ	1	In this seminar, we conduct talk series of scientists who are well-known throughout the world in cutting edge in the field of neuroscience, behavioral sciences, and computational theory. Participants will not only learn the cutting edge of the latest research, but also will attempt to obtain a wider perspective on their own field by gaining a wider point of view bridging understanding across the nervous, behavioral, and social levels that form the bases of the sciences of the mind. This seminar is partly conducted in the Brain Science Workshop.
Advanced Mind Sciences Ⅱ 心の科学先端セミナーⅡ	1	In this seminar, we conduct talk series of scientists who are well-known throughout the world in cutting edge in the field of neuroscience, behavioral sciences, and computational theory. Participants will apply their own experiences in `Advanced Mind Sciences Ⅱ' to obtain effective information as discussing with top researchers working in a variety of fields. This seminar is partly conducted in the Brain Science Workshop.
Mathematical Brain Science 脳の数理	2	Human and animal brains can extract important information from huge sensory information, and can learn appropriate behavior through experience. This ability is impossible for current computers to perform. This lecture introduces various interesting phenomena in neuroscience and psychology, while mathematically describing the phenomena and exploring mechanisms behind the phenomena. Students will learn using concrete examples in which mathematics plays a role in exploring these mechanisms, and cultivate mathematical skills.

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Brain and Machine learning 脳と機械学習	2	This course explains the basics of machine learning and the relationship with neuroscience. In particular, the three frameworks of supervised, unsupervised, reinforcement learning and each learning algorithm were explained. Students will study about concrete machine learning methods such as statistical basic knowledge that supports these algorithms, regression, classification problem, and Bayesian inference. I also explain the relationship between these statistical concepts, or learning algorithms, and the neural mechanism of perception and decision making. In particular, students will understand the computational theory of visual cortex and the basal ganglia explained by the neural correlates of these algorithms.
Neural Signal Processing 神経信号処理	2	To understand signal processing in the brain, it is necessary to analyze functional spike activity of neurons which can be measured through electrophysiological techniques. In this lecture, students will learn the basics, merits and demerits, and applications of several electrophysiological techniques, focusing on representative researches on the mechanism of neural signal processing. The students will also have a simulated experience to review an original paper as a reviewer with scientific insight and criticism so as to clarify neural signal processing.
Cognitive Developmental Robotics 知能発達ロボティクス	2	This course introduces more advanced content related to cognitive robotics and the latest research developments. Various technologies are related to robotics technology, such as machinery, electronics, and information technology, and we believe that artificial-intelligence technology is important in combining all of these. The objective of this course is for students to acquire knowledge and deepen their understanding regarding granting robots intelligence and autonomy, by considering elemental technologies such as image processing, motion generation, and situated reasoning, and how to combine these with a focus on developing intelligence in robots. In particular, students will consider the implementation of robots that behave autonomously while interfacing with environments in the real world, from the perspective of learning algorithms.
Systems Neuroscience システム神経科学	2	The higher brain functions, such as sensory perception and cognition, goal-directed action, emotion, judgment, and thinking are performed via nerve cells (of which there are over ten billion in the cerebral cortex alone) forming a unique network in the brain and carrying out the expression and processing of neural information based on brain's operating principles. In "Systems Neuroscience", students will organize knowledge about neuronal mechanisms of feature extraction and object recognition through sensory systems, control of behavior, learning and memory, emotion and motivation, and decision-making. Students will learn how to integrate knowledge of systems neuroscience and that of psychology and computational theories.
Cognitive Neuroscience 認知神経科学	2	The primordial question, "what is humanity," has traditionally come from the fields of philosophy and literature. The essential organ that makes us human from natural sciences point of view is the brain. Neuroscience has developed remarkably over the past few decades, and we have become able to examine the functions of the human brain scientifically. Students will deepen their understanding of the structure of the human brain, scientific methodologies for studying the functions of the human brain, results that have been obtained in neuroscience to date, and the possibility of change in human understanding based on neuroscience.
Brain Science and Humans 脳科学と人間	2	The fundamental question, "what is human being," has traditionally been addressed in the fields of philosophy and literature. From the viewpont of natural sciences, it is the brain that makes us human. Neuroscience has developed remarkably over the past few decades, and we are now able to investigate human brain functions scientifically. Through this class, students will better understand the structure of the human brain, the methodologies to study human brain functions, a variety of results from neuroscience, and the possibility of change in understanding human being on the basis of neuroscience.

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Neuroimaging Analysis 脳イメージ解析学	2	The objective of this course is to understand basic knowledge and technologies necessary in functional MRI (fMRI) research. Students will come up with basic problems in order to measure brain activity using fMRI, will carry out fMRI experiments using these problems, and will analyze fMRI data. Additionally, the course will explain more complicated analysis techniques (correlated analysis and network analysis). Students will learn of the brain functions that can be understood using neuroimaging (as well as its limitations), and will obtain knowledge to allow them to accurately understand research papers in which fMRI was used.
Developmental Science 発達科学基礎論	2	The goal of this class is to deepen understanding of the primary factors related to mechanisms of child development from a scientific perspective. Students will discuss and consider establishing developmental science research topics and their application, while obtaining wide-ranging knowledge in developmental psychology, cognitive science, brain science, and neurophysiology.
Psycholinguistics 言語発達心理学	2	Students will deepen their understanding related to human language utilization, namely, production, comprehension, writing and reading, from dimensions such as basic cognitive mechanisms, acquision, and evolution. They will also consider clinical and engineering applications.
Educational Psychology 教育発達心理学	2	Students aim to interpret activities at childcare and educational sites based on psychological findings, widen their view of human understanding, and deepen their understanding. In particular, students will grasp childrearing and educational processes based on the latest research developments, and will investigate to what degree "teaching" activities (thought to be unique to humans) support these childrearing and educational processes. Additionally, students will consider how these activities at childcare and educational sites are inseparable from culture and situational relationships. Specifically, students will engage in discussion while interpreting the latest research, and will investigate childcare and educational practices from a standpoint based on research results.
Experimental Social Psychology 実験社会心理学	2	Social psychology is an academic discipline that investigates the workings of the human mind in mainly interpersonal situations. This course will not only deepen students' understanding of which environmental factors have an effect on social behaviors, but will deepen their understanding of how they are processed within the individual by introducing important behavioral experiments in social psychology and touching upon social neuroscience, where much experimentation has been conducted recently. Specifically, the objective of this course is to deepen students' understanding related to the neural bases of social behaviors by introducing experiments that use functional magnetic resonance imaging (fMRI).
Behavioral Sciences 行動科学	2	The mind cannot be physically held, so one valid means to understand it is to examine observable behaviors created through the working of the mind. We will consider how the mind is formed in the evolution as well as in the environments and societies of humans and animals, by learning human and animal behaviors through observations and experiments, and highlighting their similarities and differences. In this lecture, students will learn many topics from basic behaviors such as perception and memory to social behaviors (including developmental changes) among humans and animals through introducing basic behavioral scientific methods and research papers. Students will aim to develop a deep human understanding from multiple viewpoints.

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Neural KANSEI Science 神経感性科学	2	We acquire information about music by listening and communicate it to other people using a natural language. The correspondence between musical entities and verbal expressions that designate them is to some extent arbitrary, however. Therefore the verbal communication of musical information may cause much misunderstanding, which in turn makes the data processing of the information by computers problematic. Drawing on the latest music theory, analytic philosophy, formal logic, and cognitive science, this course discusses the categorization and the formation of notions of musical entities and examines the relationships between the knowledge representation of music and natural languages.
Molecular Life Science 分子生命科学	2	Molecular biological research methods are put into practice in a wide variety of life science research fields from basic biology to applied sciences including medical science. In this lecture, students first learn basic knowelde of molecular biology that crucial for researchers involved in the life sciences. Then, they attempt to clarify to what degree brain functions are clarified at molecular levels, by reading recent research papaers in which molecular biological techniques are used.
Internship 560 インターンシップ 560	2	With the goal of connecting the specialized knowledge and skills they have gained thus far in their learning with the knowledge and skills required by society, students will aim to carry out work experience related to their fields of specialty or to their future careers at places of employment such as corporations or research institutions. Through internships, students further increase their specialized knowledge, and at the same time become able to design accurate learning goals for acquiring wide-ranging and related specialized knowledge, by understanding relations and gaps in their own research topics.
Mind Sciences Research Method Ⅰ (Research Survey) 心の科学研究法Ⅰ（研究サーベイ）	2	Research in Master's Program develops findings, technologies, and ways of thinking that are recognized as widely useful in a given field. Therefore, it is necessary to understand through which means research is carried out in the field of modern sciences of the mind, and estimate the direction of future research by understanding the flow of research until now. This course provides students with knowledge in order to position their own research in the world and continue on to planning the next step to take in their research, by teaching them methods to read and organize literature related to the sciences of the mind.
Mind Sciences Research Method Ⅱ (Research Planning) 心の科学研究法Ⅱ（研究計画）	2	Research is a method of providing new experiences and knowledge through observations, analysis, and experimentaion on existing findings. Research requires that existing knowledge and knowledge that one hopes to obtain are rigorously classified. It also requires strict and logical planning and implementation in order to obtain truly new knowledge. This course provides students with methodologies to reliably prepare research on the sciences of the mind through close discussion between students and faculty advisors. Students must have obtained credit for the "Mind Sciences Research Methods Ⅰ (Research Survey) course" in order to take this course.
Mind Sciences Research Method Ⅲ (Data Analysis) 心の科学研究法Ⅲ（データ解析）	2	In addition to targeted phenomena, errors are introduced in data obtained through surveys and experiments as a result of a variety of factors. The research process requires researchers to eliminate these factors one-by-one, and grasp the true characteristics that show the sought phenomena. This course discusses models for experimental data and analysis methods used in the sciences of the mind, and guides students in how to think about constructing theories and models for phenomena in the sciences of the mind through discussion on surveys and experiment data with faculty advisors. Students must have obtained credit for the "Mind Sciences Research Methods Ⅰ (Research Survey)" and "Mind Sciences Research Methods Ⅱ (Research Planning)" courses in order to take this course.

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Mind Sciences Research Method Ⅳ (Thesis Writing) 心の科学研究法Ⅳ（論文作成）	2	Research first becomes significant when intentions, methodologies, and results are shown, interpretations of the results have been deeply discussed, and it has all been recorded as an original research paper with novelty and validity that anyone would recognize. While writing a research paper on the sciences of the mind wherein readers will understand one's intent and acknowledge its novelty is not an easy task, it is the standard technique to have one's research recognized. In this course, faculty advisors individually guide students on these methods. Students must have obtained credit for the "Mind Sciences Research Methods Ⅰ（Research Survey）," "Mind Sciences Research Methods Ⅱ（Research Planning）," and "Mind Sciences Research MethodsⅢ（Data Analysis）" courses in order to take this course.