８．Descriptions of all courses offered by Collaborative Graduate Program in Design

（デザイン学科目の概要説明）

Practice in Design
（デザイン学共通実習科目）

●Field based Learning/Problem based Learning (FBL/PBL) 1 , 2

（問題発見型/解決型学習(FBL/PBL) 1・2）

This course is designed to enable students to put design theories and design methods into practice and to acquire these theories and methods. In Field based Learning (FBL), students can experience the process of finding the problems to be solved from a given real-world fields as a team project. In Problem based Learning (PBL), students can experience the process of solving a given real-world problem as a team project.

●Open Innovation Practice 1 , 2　（オープンイノベーション実習 1・2）

This course facilitates additional skills development opportunities. Especially students are expected to train the skills necessary to develop and manage their careers across a broad range of employment sectors, including academia in design. To attain this, students are to conduct with the relevant specialists and stakeholders and to appreciate the importance of initiating new projects for open innovation, proactively reacting to newly identified needs or aiming to resolve persistent problems. For this problem solving, students are requested to form a team and to develop and maintain effective relationships with colleagues by working in a collaborative environment and to organizing a series of workshops with those colleagues. Through these practices, students are obliged to understand leadership in team environments, recognizing the strengths of team members and work effectively to achieve mutual goals as well as to understand the role of innovation and creativity in research. Students are to respond to abstract problems that expand and redefine existing procedural knowledge. Also they are required to demonstrate effective writing and publishing skills, demonstrating design methodologies and exhibiting knowledge of design theories.

Internship in Design
（デザイン学共通インターンシップ科目）

●Research Internship　（リサーチインターンシップ）

This course provides a program of international internship in which doctoral students are sent to our partner institutions for mid- or long-term periods of 30 days or longer to foster leadership in collaborative research environments. This program fosters students capable of creating and developing novel academic and research fields with a vision that crosses different academic boundaries and is to let them conduct independent and autonomous research projects. The proposals to attend the international mid-term schools organized by our partnership institutions are also accepted. Recipients are selected via a competitive assessment process evaluated at the steering committee as well as by overseas researchers with respect to feasibility, significance, preparedness etc. of the proposed plans. Recipients are obliged to be monitored during their stay by their mentors and to give a debriefing presentation when they come back from the internship.

●Filed Internship　（フィールドインターンシップ）

This course provides a program of field internship in which doctoral students are sent to external fields out of the campus (either of domestic or abroad) for mid- or long-term periods of 30 days or longer to be engaged in the group work. The proposals to attend the international internship programs organized by the third parties such as IAESTE, ISEC, and Vulcanus are also accepted. Recipients are selected via a competitive assessment process evaluated at the steering committee as well as by overseas researchers. Recipients are obliged to exhibit knowledge of advances and developments in design and to demonstrate knowledge by comprehending and effectively employing appropriate design methodologies. Recipients are obliged to be monitored during their stay by their mentors and to give a debriefing presentation when they come back from the internship.

General Design Courses
（デザイン学共通科目）

●**Design Methodology　（デザイン方法論）**

In the 21st century, it is required to reconsider what is a design and what is a design method. The era a simple artifact is requested is over, and we have to create environmental and social systems including various relations such as the relation among artifacts, the relation between artifacts and men & environment, and the relation among human beings. The role of design is to develop "Human Centered Design (HCD)" which creates meaningful experiences through system integration of man-environmental systems.

In this lecture, we explore the design methodology as a basic theory of design after 1960's, explaining design problems, design process, design method, design thinking, and design science based on the design studies in various design fields such as craft, product, architecture, city, landscape, environment, community, education, society, mobility, business, and information.

Especially to investigate the mechanism of creative design thinking is very important to solve the daily life problems and many difficult problems human kind encounters. Therefore we explain the design semiotics to clarify the mechanism of generating creative designs and to show valuable examples.

●**Artifact Design　（アーティファクトデザイン論）**

The activity of design is fundamentally similar across a wide variety of domains. I use artifact in a broad and atypical sense to describe any product of intentional creation, including physical goods, services, information systems, buildings, landscapes, organizations, and societies. The central theme of this lecture is that a unifying framework informs the human activity of design across all domains. For this purpose, the following steps of the design process are described: Sense gap, Define problem, Explore alternatives, and Select plan according to the Ulrich's classification. The principles and methodologies for each of those steps are provided in the lecture. Moreover, understanding user needs is a key element of problem definition, and that understanding is usually best developed with interactive and immersive methods. In this lecture, a variety of methodologies for participatory systems approach and an idea of user-experience are provided, and its contributions to the design process are discussed.

●**Information Design　（インフォーメーションデザイン論）**

  Any valuable information or knowledge does not make sense if it is not transferred effectively among human beings and our society. We need to organize, design and present information in a way that fosters efficient and effective understanding of it.

  This course lectures information design, interaction design and visual design. Main topics of the course are: information design and information comprehension (sense-making) theory, information credibility, information organization, spatial cognition/cognitive maps/way finding, linguistics and information design, designing user interface & interactions, photo grammar & film grammar, story-telling, and information visualization.

●**Organization and Community Design　（組織・コミュニティデザイン論）**

Design of social organizations and communities is a critical component of any design. As we design any artifact--material or otherwise, we need to understand how people understand and act upon the artifacts. Social organizations and communities are then understood and redesigned. For this redesign, designers need to participate in the social organization or the community so that the design they produce is part of the organization or community. In this course, students will learn the basic ideas of organizational and community design and then experience the practices in the field. To do some work in the field, many sessions will be held over the weekend. Any students who seek to learn design are encouraged to take this course to acquire the basic literacy for design of any kind.

●**Field Analysis　（フィールド分析法）**

  As a methodology of field analysis required to make product designs of products, services and business in the real field, we give some lectures and related exercise which include field research methods (ethnography, surveys method), quantitative analysis methods (various statistical analysis methods) and　model building and simulation methods.

  After learning of the target field selection, setting of the investigation, and determination of the contents of the survey, you carry out the field research work using ethnography, survey methods and so on. At the next step, you　learn data analysis methods using field data obtained from the field works. Finally, we hold the design workshop using the results of the actual field works which are obtained from construction of field analysis model, system dynamics, multi-agents simulation and so forth.

Domain Design Courses
（デザイン学領域科目）

Domain Design Courses (Informatics)
（情報学領域科目）

●Design in ICT　（情報通信技術のデザイン）
Computers and communication networks are representative complex technical artifacts, but it is not an easy task to perceive their construction principles because their design processes are invisible for us.　In this course, we study design principles for information and computer technology (ICT) in terms of (1) hierarchical abstraction, (2) tradeoff, and (3) human and social analogy, being the computers and the communication networks as specific examples.　Recent advances and directions for the design of future ICT will be also discussed using the above design principles.

●Industrial mathematics and design　（数理とデザイン）
Methodologies of mathematical modeling, statistical data analysis, and mathematical optimization are discussed as mathematical common languages supporting inter-disciplinary viewpoints and design thinking for resolving complex problems in today's societies. Various concepts in industrial mathematics used in modeling objects are reviewed to develop high-angle viewpoints for modeling, and data analysis and optimization are lectured as systematic problem-solving methodologies utilizing mathematical modeling. Tools and solvers useful for dealing with practical problems are also reviewed.

●Pattern Recognition, Adv.　（パターン認識特論）
We first explain fundamentals of pattern recognition, clustering methods with several distance measures, and discriminant functions with their learning methods. We then introduce advanced classifiers such as HMM, SVM and CRF and also related topics of machine learning theory, which includes EM learning, the MDL criteria, and Bayesian learning.

●Language Information Processing, Adv.　（言語情報処理特論）
This lecture focuses on morphological analysis, syntactic analysis, semantic analysis, and context analysis, including machine learning approaches, which are necessary to process natural language texts.
We also explain their applications such as information retrieval and machine translation.

●**Introduction to Algorithms and Informatics** （アルゴリズム論）

This is an introductory course on algorithms and informatics for students with no prior knowledge of the subject matter.

The course content will include a look at the early history of algorithms, how computers store data (image, sound, and video), privacy and security issues, web design and algorithms, algorithms for optimization, data mining, and machine learning.

Along the way, we will consider a broad variety of algorithms which have had a major impact on computing, including many of the celebrated "Top 10 Algorithms of the 20th Century," chosen by the editors of *Computers in Science and Engineering*.

●**Transmission Media Engineering, Adv.** （伝送メディア工学特論）

This course introduces the following: (1) the technical foundations of wireless and wired transmission technologies such as synchronization; (2) communications link analysis; (3) multiple access and medium access control schemes; and (4) radio resource management based on optimization and game theory.

●**Computational Science for Big Data** （ビッグデータの計算科学）

Because of the recent progress in a computer or the maintenance of intelligence infrastructure technology, the increase of the quantity of the data generated from the social activity performed through the Internet such as cloud computing and the quantity of the data obtained through the computer simulation which is an important technique of computational science, is being enhanced every day. It is the purpose of this course to study the technique for analyzing and visualizing those big data. In particular, the data analysis to the large sparse matrix is exercised using the C language.

●**Supercomputing, Advanced** （スーパーコンピューティング特論）

This lecture is for learning architectural and software issues in supercomputing focusing on parallel high-performance scientific computing.　The students will use the supercomputer in ACCMS to learn how a real supercomputer works.　The lecture is open to students from any graduate schools whose convenience to attend the lecture is regarded by assigning the fifth period for the lecture.

●**Optimization Theory, Advanced** （最適化数理特論）

Lecture on basic optimization theory and algorithm design for solving mathematical programming problems. Topics include duality in nonlinear optimization, interior point methods for linear and convex programming problems, convex optimization approaches to real-world problems.

●**Artificial Intelligence, Adv.**

Conversational interaction is considered to be a powerful communication means for intelligent actors, either natural or artificial, to interact each other to act as a collective intelligence. In this course, we study the mechanism of conversational interactions with verbal and nonverbal cues from computational points of view and discuss key issues in designing conversational systems that can interact with people in a conversational fashion.

●**Control Systems Theory, Advanced (制御システム特論)**

This course introduces fundamental ideas regarding robust control theory and explores control system design methods, with system model uncertainty taken into account. The course also discusses the importance of system model uncertainty based on frequency-domain and state-space methods. Topics covered include robust stability conditions and feedback system design that achieves robustness.

●**Statistical Systems Theory （統計的システム論）**

Introduction to stochastic and statistical models, which appear in various physical/engineering systems. Topics include model selection, statistical signal processing, Kalman filter, application of stochastic analysis, and related matters.

●**Theory of Symbiotic Systems （共生システム論）**

Various theories on developing and maintaining harmonious symbiosis among humans, artifacts, and environments are lectured and discussed. Topics include typical forms of harmonious coexistence such as in ecological systems, caring and artistic nature of communication and interactions, philosophical discussions on deep-ecology, and methodologies for designing symbiotic systems.

●**Social Informatics （情報社会論）**

This course introduces social issues dealing with the impact of information technology on society: information policy, information and law, information and economics, information ethics, and information and education. Students will learn the social aspects of information technology from multi-disciplinary viewpoints: the history and trends of information technology; problematic issues regarding an information society; social revolution brought on by information technology, privacy, and security issues; policies concerning information, intellectual properties, and the way IT experts think and the responsibilities they bear.

●Information and Intellectual Property　（情報と知財）

This course introduces the copy right law and copy rights of digital contents, the patent law and patents related to IT area (software patent, business model patent etc.), information technology for management and creation of intellectual properties, the law for the protection of computer-processed personal data held by administrative organs, information ethics and information security. Students are required to acquire the fundamental knowledge of the copy right law, the patent law, information technology for management and creation of intellectual properties, the law for the protection of computer-processed personal data held by administrative organs, information ethics and information security.

●Information Networks　（情報ネットワーク）

This course introduces architecture of information networks including communication protocol and layered structure.　Various networks and their technologies, such as circuit switching network, IP network, photonic network, and mobile network, are explained.

●Information Systems Design　（情報システムデザイン）

This course introduces fundamental concepts, methodologies and underlying technologies for analyzing, designing and implementing social information systems.　In particular, the course presents fundamental concepts regarding object-oriented computing, object-oriented design and analysis methodology, database design, user interface design, and design and practice of Web-based information systems including databases.　Students will examine design methodology and implementation/operation technologies to learn how information systems are designed, implemented and operated.　In conjunction with lectures, students will complete exercises on information system design so that they may understand the theory and technology by applying them to real information system design.

●Designs for Emergency Management　（防災・減災デザイン論）

Damage from disasters is defined by two factors: scale of hazard and social vulnerability. Two strategies exist to reduce damage from disasters - namely, crisis management as a post-event countermeasure and risk management as a pre-event measure. This course introduces students to a system for effective emergency management, consisting of response, recovery, mitigation, and preparedness.

Domain Design Courses
（デザイン学領域科目）

Domain Design Courses (Mechanical Engineering)
（機械工学領域科目）

●Design of Complex Mechanical Systems　（複雑系機械システムのデザイン）

Design of mechanical systems in the future will require developing novel technologies that are able to achieve a harmonized and symbiotic relationship with the environments. This lecture elucidates mechanical phenomenon that realize autonomous adaptation in harmony with the environment, especially with respect to material systems characterized by microscopic structure and macroscopic properties, living organism systems with diversity and self-repair, human-machine systems characterized by interaction and coordination, etc. Therein, complex behaviors emerge being caused by complex interactions at different spatio-temporal scales. This lecture provides a number of governing principles of such complex mechanical phenomenon, and then introduces methods for utilizing those phenomenon to design flexible and adaptive artifacts whose constituent parts are able to alter their functions in response to the surrounding environments.

●Control Theory for Dynamic Systems　（動的システム制御論）

This lecture introduces state space approach for designing control systems and the basic control theory to understand the behavior of the dynamical system quantitatively. State feedback control, pole placement, observers, methods for designing feedback controllers, dynamic programming, and optimization for dynamical systems are detailed. In this lecture, state space representations of mechanical systems and aerospace systems and its application to designing controllers are also outlined. The final purpose of this lecture is to acquire the basis of control theory and optimization theory for dynamical systems.

●Design and Manufacturing　（設計生産論）

The first half of the course discusses fundamental theories and technologies for production design with product life cycle management. The digital engineering, conceptual design methodologies, and design/production management are covered. In the last half of the course, computer-aided design, manufacturing and testing (CAD, CAM, and CAT) technologies are presented. Geometric modeling theories as the basis of CAD, tool path design as the basis of CAM, and latest manufacturing technologies related to advances in CAD/CAM technologies are discussed. The contribution of computer-aided technologies to today's manufacturing and machining processes is in the main focus of this course.

●**Robotics** （ロボティクス）

Understanding of intelligent behaviors of living things is very interesting. And realization of their intelligent motion by a robot is also attractive for mechanical engineering. In this lecture, we consider basic understanding of beautiful human skill "manipulation" on the point of view of dynamics and control. First modeling methodologies for a rigid multibody system and a general dynamic model of a manipulator are provided. Next, a typical nonlinear control law is introduced and some problems for applying the controller are shown. Based on nature of the dynamics of the manipulator, a very simple and robust controller can be derived by designing energy of the system. This lecture provides modeling methodologies and controller design strategies of the rigid multibody system and we analyze a beautiful human skill of the manipulation.

●**Design Systems Engineering** （デザインシステム学）

The lecture focuses on the human design activity; designing artifacts (things, events and systems) based on human intuitions, and designing human-machine systems in which the relations between human and objects are of importance. Therein, optimization and uncertainties are key issues for designing the human-machine systems. In this lecture, representative approaches to the optimal control design methods are provided including control design under uncertainties as well as methods for estimating system parameters under uncertainties like the maximum likelihood estimation and the Kalman filters.

●**Engineering Ethics and Management of Technology** （技術者倫理と技術経営）

Basic knowledge of Engineering Ethics and Management of Technology needed for future project leaders in companies and society is taught. Students have to make group work after-class hours as well as presentations of wrapping-up the discussions. Engineering ethics is the field of applied ethics and system of moral principles that apply to the practice of engineering. The field examines and sets the obligations by engineers to society, to their clients, and to the profession. Management of Technology is a set of management disciplines that allows organizations to manage their technological fundamentals to create competitive advantage. This course consists of lectures, exercises, discussions and oral presentations under supervision of professional faculties and extramural lecturers.

●**Optimum System Design Engineering** （最適システム設計論）

This series of lectures presents the fundamental theories of the system design optimization techniques used when dealing with real-world manufacturing problems. The first lectures in this course focus on the background of this subject, the importance of design optimization for developing improved solutions to recent engineering problems, and the classification of optimal system design problems. The fundamental methodologies of optimization approaches such as local and global optimization techniques and combinatorial optimization techniques are then presented. Practical techniques such as structural optimization and optimal system design are also discussed.

Domain Design Courses
（デザイン学領域科目）

Domain Design Courses (Architecture)
（建築学領域科目）

●Design Theory of Man-Environment Systems　（建築・都市デザイン論）

We are now strongly required to extend the design object from the artifact environment to man-environment system in the field of architecture, city, environment, and landscape. It is not enough to construct the general theory of design separated from specific design fields, and we have to develop "Man-environment System Design Theory" to organize design objects and design methods, because the feeling and knowledge on design object have a great influence on design process. In this lecture, we explain design theories and design methods in architectural and urban fields from the multiple viewpoints such as architectural and urban planning & design, landscape design, history and design, social system engineering, and environmental engineering. Moreover we will try to illustrate some design projects as case studies.

●Design Theory of Architectural Structure　（建築構造デザイン論）

The following design problems and methods for architectural structures in urban space are explained.

1) Method to derive practical design solutions under severe design criteria, complicated design condition and extreme situation.

2) Practical structural design problems and their solution methods.

3) How to design a challenging new architectural structures.

●Theory of Architectural and Environmental Planning　（建築環境計画論）

Living environment including architectural and urban space is generated by means of the dynamic interaction between man and environment. We are able to find multi-layered complex relations such as function, performance, meaning and value, changing with the time. The role of design is to read various networks of relations, and to develop them to human living environment. The objectives of this lecture are as follows; 1) to read the principles of multi-layered man-environment relations based on "semiotics", "design methodology", and "system theory", 2) to explore the possibility to design comfortable environments and fascinating landscapes based on those principles of man-environment system.

●**Design Theory of Architecture and Human Environment**　（人間生活環境デザイン論）

Human environment is to be examined and understood as the dynamic interaction between human activity and the environment. As cities and regions are changing rapidly nowadays, urban and regional planning should be discussed as the planning for the creation of new value and not-actualized meaning of the environment, instead of concerning only on functions and performance. Here we study and discuss the cases of the re-evaluated urban and regional spaces as well as architectural groups, methods to generate the relation between human activity and environment, with the interest in new ideas of urban design, rural design, landscape design, community design, and others.

●**Theory of Architecture and Environment Design, Adv.**　（生活空間学特論）

Human space, in other words, architectural space, differs according to the culture which the space belongs to. In this whole world, within the centuries length of human history, concept of human space has been established with the cultural matuarity.　In this lecture series, we deal with the concept of "cultural sustainability", which represents the cultural affairs including changes,　losses, birth and transition.

●**Design Mechanics for Building Structures**　（建築設計力学）

Basic mechanics and inverse problem for design of building structures are explained. Structural optimization methods are also presented. Rational structural design approaches are introduced in place of conventional try-and-error approaches. A design methodology based on the concept of performance-based design is also explained.

●**High Performance Structural System Engineering**　（高性能構造工学）

Mechanical properties required for various types of seismic resisting members and seismic energy dissipation devices for building structures are explained. Elements and advanced theory for seismic design of moment resisting frames and response-controlled buildings are described based on mechanical model of typical seismic resisting members and response control devices. The methodology to integrate structural performance of devices into the design procedure is introduced.

●**Environmental Control Engineering, Adv.**　（環境制御工学特論）

This lecture deals with functional aspects of building envelope as a shelter from outdoor climate. Lecture will be given on specified topic on principles of thermal and moisture insulation, control strategy of indoor environment, the prediction methods of air flow, thermal radiation and indoor air quality. Examples will be shown for use in building design for thermal environment control and safety problems during fire.

Domain Design Courses
（デザイン学領域科目）

Domain Design Courses (Management)
（経営学領域科目）

●**Business Design** 　（事業デザイン論）

This course is a practical business-design workshop in a leading Graduate School of Design. We learn business plan generation such as new business planning, evaluation and improvement on an existing business, and developing new innovative idea for an existing business.

In this course, we learn the business planning framework "Business Model Canvas" in　a book *Business Model Generation*. And using this framework we learn wide variation of business components and adjustment of them so as to form a whole system. 　We will be able to plan a comprehensive and consistent business. Therefore, this class consists of lecture on business components, 　mini group discussion, 　group work and presentation to analyze of an existing business model and to plan a reform plan base on "Business Model Canvas."

●**Design Management** 　（デザイン経営論）

Nowadays, "design" has become more and more important factor in business field. In this course, we discuss the various aspects of design in the business context, which are design strategies, marketing, customer experience, creative organizations and service design as well as a definition of a design. Furthermore, students learn ways of thinking such as "functional approach" and "design thinking." In addition, "designer's elaboration" is also learned. This course is planned for students who want to obtain a broad perspective of relationship between design and management.

●**Magaging Innovation:From R&D towards New Business Development** 　（研究・事業開発マネジメント）

Innovation management is increasingly important for enterprises to sustain their businesses. However, it would not be easy, in particular, for Japanese enterprises to conduct innovation management with an entrepreneur mindset. In order to learn innovation management with entrepreneurship, we will focus on the innovation process from R&D towards composing strategies for new business development in this course. Over the semester, we will learn key innovation management aspects, e.g., finding business opportunities, making business models, figuring finance models, analyzing existing business with SEC annual reports, and designing value creation processes. The course consists of lectures, case analyses, special lectures given out by visiting experts, and student presentations based on the knowledge that they gained throughout this course. Those who wish to work for global businesses, business development for high-tech industries, start-ups, service design management, etc., are welcome to enroll.

●**Service Innovation Management　（サービス経営論）**

Designing value creation from the viewpoint of service dominant logic is increasingly important for any business. The purpose of this course is to educate students to become a part of the Service Creative Class, where they acquire the capabilities of deeply understanding human behaviors, extracting the vital economic and social values through the combined knowledge of the natural and social sciences. In order to pursue such design capabilities, various kinds of interdisciplinary knowledge are required. In this course, we will focus on key service innovation management. The components that are included in this course are; service marketing, human resource management, service strategies, service accounting service hospitality, IT service management, and applications to several vertical domains as public services or professional services. The course is provided by a series of omnibus style lectures. Those who wish to work for global businesses, business development for high-tech industries, start-ups, service design management, etc. in the context of knowledge and servicizing economy, are welcome to enroll.

●**Marketing Research　（マーケティングリサーチ）**

This course (Marketing Research) is designed to give an overview or process of marketing in order to identify and solve marketing problems. It focuses not only on giving fundamental knowledge but also on applying its knowledge to marketing problems. It should be practical.

●**Design Ethnography　（デザインエスノグラフィ）**

Ethnography is seen as one of the key methods for design. At minimum, designers need to understand the field in which they are to introduce their designs. For this, it is not enough to ask people; it is necessary to gain a first-hand understanding through experiencing the lives in the field. Through ethnography, designers can grasp taken-for-granted experiences and start to look at their problems from a fresh perspective. In this course, students will learn the basics of ethnography (e.g., how to write fieldnotes, how to make observations and how to analyze the data) and develop their skills through group projects. This course focuses on the ethnography part of design although in reality it cannot be separated from the rest of the design. Students are encouraged to take other courses on design so that they can fully exploit the insights gained through ethnography.

Domain Design Courses
（デザイン学領域科目）

Domain Design Courses (Psychology)
（心理学領域科目）

●**Cognitive Theory of Design**　（認知デザイン特論）

Cognitive psychology posits that the human activities involved in the design process can be grasped by examining the brain, mind, and behavior.　The objective of this course is to encourage comprehensive discussions of design based on cognitive psychology theory.　First, we will gain a better understanding of how the brain, the mind, and behavior are designed.　Second, we will discuss their respective constraints and explore the relationships that exist between those constraints and the rich cognitive activity that results when we turn constraints into advantages.　Third, we will examine examples drawn from literature, art, and music that will serve as the basis for discussions about the relationships that exist among the functions of the brain, the mind, and behavior.　We will also examine the rich designs each function can produce. Finally, to improve students' abilities to produce rich designs, we will discuss various environmental factors to encourage the development and activation of our own brains, minds, and behaviors.

●**Seminar on Psychology and Design studies I**　（心理システムデザイン演習 I）

This course aims to deepen students' research content.　Faculty and students will provide presentations and engage in mutual discussions of the latest research.　This will help students acquire broader knowledge of diverse specialized disciplines.　Students will also examine and discuss literature selected from related disciplines.

The course will help students discover new directions for research by helping them plot their research themes on a time axis (the flow of students' research from the past to the present) and on a space axis (the relationship of students' research to research being conducted in neighboring disciplines).　It will also help them reexamine their research in relation to these axes.

This course has three objectives related to students' research themes: (1) deepening students' abilities to think so they can achieve higher standards; (2) deepening students' understanding of the latest research trends in various specialized fields; (3) helping students acquire skills needed to report research in an interesting, easily-understandable way; and (4) helping students acquire skills required to conduct constructive discussions.

●**Seminar on Psychology and Design studies II　（心理システムデザイン演習 II）**

This course aims to deepen students' research content.　Faculty and students will provide presentations and engage in mutual discussions of the latest research.　This will help students acquire broader knowledge of diverse specialized disciplines.　Students will also examine and discuss literature selected from related disciplines.

The course will help students discover new directions for research by helping them plot their research themes on a time axis (the flow of students' research from the past to the present) and on a space axis (the relationship of students' research to research being conducted in neighboring disciplines).　It will also help them reexamine their research in relation to these axes.

This course has three objectives related to students' research themes: (1) deepening students' abilities to think so they can achieve higher standards; (2) deepening students' understanding of the latest research trends in various specialized fields; (3) helping students acquire skills needed to report research in an interesting, easily-understandable way; and (4) helping students acquire skills required to conduct constructive discussions.

●**Seminar on Data Analysis in Psychology and Design Studies　（心理デザインデータ解析演習）**

This course will review the major methods used in multivariate data analysis (factor analysis, regression analysis, structural equation modeling, etc.) of psychological data employed during the exploration of human cognition and design processes.　The primary goal of this course is to increase students' abilities to understand and perform these types of statistical analyses on their own experimental data.　Students will learn to use a number of software packages (SPSS, R, etc.).　In addition, students will acquire the skills required to write high-level academic papers.

●**Design of Cognitive functions　（認知機能デザイン論）**

This course explains recent findings related to the relationship that exists between the brain and cognitive function.　Primary focus is placed on frontal lobe functions, memory, emotion, and social cognition.　The objectives of this course are to help students develop a foundation in cognitive neuroscience and to help students employ this knowledge in their research.　These objectives will be achieved by presenting essential knowledge in the simplest manner possible.　Students will acquire and improve their developmental and constructive thinking abilities by discussing lectures presented by eminent researchers worldwide.

●**Advanced Studies: Cognitive Sciences　（デザイン心理学特論）**

Language divides the world by the use of symbols known as words.　However, how do children learn to use language?　How do children change as they acquire language?　How dependent is thought on language?　How does thought differ among speakers of different languages?　In this course, students will consider the following questions by engaging in experimental research in cognitive science: (1) what are the processes involved in child language acquisition; (2) what are the processes involved in the development of concepts; (3) what kinds of relationships exist between language and concept learning; and (4) what kinds of relationships exist between language and thought?

●Seminar on Brain Function and Design Studies　（脳機能デザイン演習）

This seminar, which is primarily rooted in neuroscience, is aimed at graduate students who are currently engaged in research or are interested in engaging in research related to cognition, emotion, and broader areas in the life sciences.　Students will participate in a review of research that may serve as a background to students' own areas of interest.　This course will consider practical aspects involved in the study of human cognition at an advanced level.　Topics include experiment planning, measurement of brain functions, data analysis and interpretation, and drafting and completion of research papers.

Communication Training in Design
（デザイン学共通コミュニケーション科目）

●**Strategic Communication Seminar (Japanese, English)**
（戦略的コミュニケーションセミナー（日本語）・（英語））

This seminar is a short-term intensive seminar to enhance the ability of communication, and consists of Japanese and English courses.

The aim of Japanese course is to strengthen the ability to speak and communicate in the scenes of giving a speech, conducting negotiations. Executive announcers of the Japanese center of NHK Communications Training Institute conduct the seminar by concentrating the know-how owned by the center.

The aim of English course is to strengthen presentation skills and speaking skills in English. Instructors of Berlitz Japan conduct the seminar by concentrating the rich contents owned by the Berlitz Japan.

Skill Training in Design
（デザイン学共通スキル科目）

●Informatics Practice I　（情報学演習 I）

  This course is dedicated for non-CS (computer science)-major students to understand fundamental information technologies and acquire "information skills" through practices. Enrolled students learn fundamental information technologies and acquire the ability of "information literacy" for acquiring, generating, managing, analyzing, and presenting information.

  Practices in this course include computer programming, but neither programming experience nor knowledge of specific programming language are required.

●Informatics Practice II　（情報学演習 II）

  This practice course is to explore and identify "information skills" that are needed in the research of architecture, mechanical engineering, pedagogy, and management science. Information-skill topics are designed by enrolled students themselves in a workshop style. Possible practice topics are (A) Web programming, (B) Web-based survey (crowd-sourcing), (C) 3D CG contents creation, (D) Human behavior analysis, (E) Information Design, and (F) Algorithmic architecture.

●Advanced Studies: Research Methods in Psychology and Design Studies　（心理デザイン研究法特論）

The goal of this course is for students to acquire skills required to convey research results in a precise and efficient manner by the use of quantitative data drawn from fields such as design study, psychology, and pedagogy.　Students will deepen their understanding of useful and advanced statistical methods employed in the conduct of empirical research and the testing of hypotheses.　They will learn to apply these methods to their own research.　The course will provide an outline of statistical methods and introduce statistical mechanisms.　It will teach students the proper use of these methods based on examinations of research examples.　Students will conduct literature reviews to discover studies that employ these methods in their investigations.　Students will examine and discuss these studies on several occasions.

●Seminar on Research Methods in Psychology and Design Studies　（心理デザイン研究法演習）

This course has three objectives: (1) students will consider system design at various levels from the perspective of psychology, (2) students will build a foundation that will help them conduct psychological experiments and surveys to examine a variety of research ideas, and (3) students will gain a better understanding of basic statistical methods required to test hypotheses by the use of psychological data.　The following themes will be covered in a seminar format: methodology in psychology research; comparisons of various methods, characteristics, and processes involved in data collection; theories of and methods employed in psychological experiments and quasi-experiments; and the basic statistics used to test hypotheses and replicate previous findings.