2006 Applicant Guidelines for Doctoral Programs (First Stage) of Graduate School of Information Science, Nagoya University (Second Round of Admissions)

Important Notice: The Japanese version of Applicant Guidelines for Doctoral Programs of Graduate School of Information Science, Nagoya University serves as the official guidebook. This English translation is provided only for applicants' convenience.

The Graduate School of Information Science invites applicants for admission to the first stage of doctoral programs (considered a master's course) for the academic year 2006, in accordance with these guidelines.

1. Qualifications for Application

Applicants must meet one of the following conditions:

(1) University graduates, or will graduate from university by March 31, 2006

(2) Persons who have obtained or will obtain, by March 31 2006, a bachelor's degree from the National Institution for Academic Degrees, as specified by the School Education Law Article 68 Item 2 No.1

(3) Persons who have completed, or will complete by March 31, 2006, 16 years of academic education in a foreign country

(4) Persons who have completed, or will complete by March 31, 2006, 16 years of academic education in Japan through correspondence courses run by foreign educational establishments

(5) Persons who have completed a foreign academic degree in an educational establishment in Japan, which is recognized in the foreign country as part of the school education system (the applicants must be recognized to have finished 16 years in an educational system of the foreign country) and completed a course of study specified by the Minister of Education, Culture, Sports, Science and Technology, Japan.

(6) Persons who have completed a course of study at higher vocational school (the course must be for more than 4 years and fulfills the criteria that is stipulated by the Minister of Education, Culture, Sports, Science and Technology, Japan) for which the Minister of Education, Culture, Sports, Science and Technology, Japan, specifies separately and who have completed the course as specified after the day fixed by the Minister of Education, Culture, Sports, Science and Technology, Japan.

(7) Persons who have qualifications approved by the Minister of Education, Culture, Sports, Science and Technology, Japan. (Notification No.5 of the Ministry of Education, 1953)

(8) Persons who have completed or will complete more than 3 years at university by March 31, 2006 or those who have completed 15 years of education at an educational system in a foreign country or enrolled in a foreign university in Japan, which is approved by the foreign country's school education system as an educational establishment (the applicants must be recognized to have finished 15 years in an educational system), and have completed a specific course of study and have been approved by the Graduate School as having excellent results of the required units.
(Note) Those who submit application forms on the basis of (8) above must refer to "Persons who submit application forms on the basis of "Qualification for Application (8)" on P.21.

(9) Persons who will be 22 years of age or over as of March 31, 2006, and have been recognized by our Graduate School, based on the results of individual examinations of the applicant's qualifications, as having academic abilities equivalent or superior to university graduates. (Note)

(Note) Those who submit application forms on the basis of (9) above must contact the Graduate School by December 14 (Wed.), 2005.

2. Numbers of Students to Be Admitted

Dept. of Computer Science and Mathematical Informatics	A few students
Dept. of Information Engineering	A few students
Dept. of Media Science	A few students
Dept. of Complex Systems Science	A few students
Dept. of Systems and Social Informatics	A few students

There may be cases whereby successful applicants may not be able to receive supervision from the professor/researcher of their choice due to educational considerations. It is advised to contact the professor/researcher of your choice in advance.

3. Application Period

Applications will be accepted between **January 18 (Wed.) and January 24 (Tue.), 2006**, from 9:00 to 16:00. (Except from 12:00 to 13:00)

4. Application Documents

Documents required for all applicants

(1) Application Form (Complete the form prescribed by our Graduate School)
(2) Examination Card and Photograph Card (Complete cards prescribed by our Graduate School)
(3) Objectives and Study Plan (Complete the form prescribed by our Graduate School)
(4) Personal History (Complete the form prescribed by our Graduate School)
(5) Receipt of Payment, a copy of the receipt of payment (Enter only your name in forms prescribed by our Graduate School)
(6) 2 self-addressed return envelopes (one for sending Examination Card, the other for correspondence). Before submitting, write your name clearly, mailing address and postal code on two envelopes prescribed by our Graduate School. Place a 350-yen stamp on the envelope for correspondence. However, those who bring the application forms to the Graduate School in person need to prepare only one envelope for correspondence.
(7) Address label (Write the necessary items on the label prescribed by our Graduate School)
(8) Certificate for (prospective) graduation or documents certifying qualification for application
(9) Official transcript of academic records (issued by your last university)
(10) Examination fee (30,000 yen by postal money order, on which name and address of designated payee should not be written)

Documents to be submitted preferably for reference

(1) If the applicant has a dissertation or other material that indicates his/her research abilities, it is desirable to submit a copy of such material and, if necessary, an abstract.
(2) If a foreign applicant studying in Japan has taken the Japanese Language Proficiency Test, it is desirable to submit a certificate or score report thereof. When submitting a copy, write, “This document is identical to the original” on the copy, which should then be signed and/or stamped with your seal.
(3) If the applicant has taken an English proficiency test (STEP, TOEIC, TOEFL etc.), it is desirable to submit a certificate or score report thereof. When submitting a copy, write “This document is identical to the original” on the copy, which should then be signed and/or stamped with your seal.

Documents to be submitted in special cases

(1) Foreign applicants residing in Japan must submit an alien registration certificate issued by their municipality office. However, those with permanent residency need not submit this document. Overseas residents must submit a document certifying their nationality and resident’s eligibility (for example, a copy of your passport showing nationality and resident status).
(2) Applicants serving in government and other public offices, companies and other organizations, and who will remain in service even after enrollment, must submit the organization’s written consent to application for admission (no prescribed form).
(3) Those who wish to apply for Dept. of Media Science must submit a “Research Subject Selection Form.”

5. Application Procedures

Applicants must put all documents required for application in the envelope prescribed by our Graduate School for sending application documents, address it to the Academic & Students Affairs Section (kyomu-gakusei-gakari) of the Graduate School of Information Science, and either bring it to the Academic & Students Affairs Section (kyomu-gakusei-gakari) in person or send it by mail.

Points of note

(1) Applicants are recommended to bring the application documents to the Academic & Students Affairs Section (kyomu-gakusei-gakari) in person.
(2) When applicants send the application documents by mail, use **registered mail** and write on the front side of the envelope "(Graduate School Application Forms Inside)" in red ink, to reach the Academic & Students Affairs Section (kyomu-gakusei-gakari) of the Graduate School of Information Science **by 16:00, January 24 (Tue.), 2006**.
(3) Examination card is issued upon receiving the application documents. (However, when application documents are sent by mail, they will be sent to the applicant by mail.)
(4) Incomplete application documents will not be accepted.
(5) After an application has been filed, we will not allow any changes to application documents, nor refund examination fees.

6. Selection

6.1 Acceptance of the Results of External English Examinations

Those applicants who submitted results of external English examinations such as TOEIC (limited to open examinations), TOEFL-PBT(Written examination of TOEFL), and TOEFL-CBT(TOEFL examination using computer), the results will be converted to suit our Graduate School and will be compared with the result of the English examination of the entrance examinations and the better result will be taken as the final result. When an applicant does not take the English examination undertaken by our Graduate School, s/he will be considered to have been "absent" regardless of the results of external examinations. Conversion table for English external examinations is available on http://www.is.nagoya-u.ac.jp/for-prep-exam.html.

TOEIC	TOEFL-PBT	TOEFL-CBT	Results after conversion
600 – 605	505 – 506	173	40
656 – 660	525	187 – 188	50
706 – 710	542 – 543	200	60
753 – 757	558 – 559	212	70
798 – 802	574 – 575	224	80
842 – 846	589 – 590	235 – 236	90
975 – 990	636 – 677	270 – 300	100

6.2 Details of Selection

(1) Successful applicants for admission to our programs will be selected on the basis of overall evaluation of the result of the written and oral examinations and application documents.
(2) The written and oral examination schedule is shown below.
(3) Announcement of the written and oral examination venues will be posted on the examination day at the entrance to the Graduate School of Information Science building (see attached map).
(4) Applicants must arrive the examination rooms at least 30 minutes before the start time of the examination and follow the instructions of the clerk in charge.

A. February 14 (Tues.)

(1) English (Written Examination for applicants of all departments) 10:00 - 11:00
One dictionary (English-Japanese or English into mother language) can be used. Computerized dictionaries, Japanese-English dictionary or any dictionary that is integrated into the above specified dictionaries are not acceptable.

(2) Individual Department Examinations

Department	Examination time and method	Test subjects (Items in parentheses are topics to be covered.)
Computer Science and Mathematical Informatics	12:30 - 14:00 Written examination	Choose and answer two questions from three questions set out on basic mathematics (linear algebra, calculus) and discrete mathematics
Information Engineering	12:30 - Oral examination	(a) and (b) below will be carried out for about 30 minutes per applicant. (a) Oral examination on Information Engineering (fundamentals of computer science, computer hardware, computer software) (b) Presentation of the graduation thesis (Approx. 10 minutes per applicant) • When there is no graduation thesis, presentation of a seminar topic or if neither graduation thesis nor seminar topic are available, presentation on the research theme which the applicant hopes undertake at our Graduate School. • In the presentation, you may use the Overhead Projector or Liquid Crystal projector. The applicant must bring the PC to be connected to Liquid Crystal projector. • In the presentation, the applicant may distribute handouts (Up to 2 sides of A4, no fixed form). If the applicant is distributing handouts, she/he needs to prepare and bring 15 copies with her/him.
Media Science	12:30 - Oral examination	The examination consists of oral questions on general items on two subjects from the six subjects set out including research content (such as graduation research) for about 30 to 40 minutes per applicant. Those who apply for Media Science should fill out the necessary items in the Research Subject Selection Form (attached) and submit it together with the other application forms. In addition, 10 copies of the outline of applicant's major (Graduation thesis etc.) (one side of A4, no fixed form) should be brought in on the examination day. Analysis/linear algebra Probability/statistics Digital signal processing (z transformation, discrete Fourier transform and FFT, filter) Sensation/Perception (Questions on basic knowledge about sensation/perception will be asked.) Learning/Memory (Questions on basic knowledge about learning/memory will be asked.) Thinking/problem-solving (Questions on basic knowledge of thinking/problem-solving will be asked.)

Department	Examination time and method	Test subjects (Items in parentheses are topics to be covered.)
Complex Systems Science	11:45 - Oral examination	The examination will be undertaken for 30 minutes per applicant in the following way. The applicant must use overhead projector or liquid crystal projector to present graduation research or its equivalent in about 10 minutes (maximum 15 minutes). Based upon the presentation, four points including the applicant's academic ability, research ability, communication ability and willingness will be evaluated. When the presentation is done using a liquid crystal projector, the applicant must bring a PC to connect to. However, it is possible that the projector will not function with certain PCs, just in case, it is better to bring a USB memory and other such recording media as well.
Systems and Social Informatics	12:30 - 15:30 Written examination	The following examination will be carried out for about 30 minutes per person. (1) Presentation of graduation research (Approx.10 minutes) Applicants give a presentation on their graduation research or seminar topics into which they put a lot of effort when an undergraduate, or a concrete research theme on which they would like to work at graduate school. All applicants must prepare a handout (one side of A4 and no fixed form) and make 20 copies to distribute at the examination. The presentation could be carried out according to this paper or using a PC (which the applicants must bring.). A liquid crystal projector will also be prepared in the examination room, which applicants may use. (2) Questions & Answers (Approx.20 minutes) Taking all applicants' major, into consideration, they will be asked questions that evaluate their basic ability. Questions will also be asked directly related to the content of their presentation. Furthermore, applicants' communication ability and willingness to study further will be evaluated through questions on objectives for applying to this department and their choice of research theme.

B. February 15 (Wed.), 2006
Oral examination

Department	Examination time
Computer Science and Mathematical Informatics	9:30 -
Information Engineering	It is implemented during the oral examination of February 14 (Tues.), 2006.
Media Science	It is implemented during the oral examination of February 14 (Tues.), 2006.
Complex Systems Science	It is implemented during the oral examination of February 14 (Tues.), 2006.
Systems and Social Informatics	It is implemented during the oral examination of February 14 (Tues.), 2006.

7. Announcement of Admissions

Announcement of admissions will be posted at noon, February 17 (Fri.), 2006, at the entrance to the Graduate School of Information Science Building. The results will also be communicated to each applicant by mail.

8. Registration Procedures

Registration procedures will be communicated to prospective students in early March. The procedure should be carried out toward the end of March 2006.

9. Registration and Tuition Fees

(1) Registration fee: 282,000 yen
(2) Tuition fee: 267,900 yen (535,800 yen for one full year)
(Note 1) Registration fee should be paid at the time of enrollment. Tuition fees should be paid separately between the Spring semester (April) and Fall semester (October).
(Note 2) Tuition fee for the Spring semester should be paid by account transfer from post office or bank using "Payment Request Form" which should be given in after enrollment. Payment from the Fall semester onward should be made by using the "Automatic Tuition Fee Payments."
(Note 3) If tuition and other fees are revised at the time of enrollment or while you are enrolled in our institution, the revised payment amount will apply from the time of revision.

10. For Overseas Applicants

(1) Objectives and Study Plan may be written in English.
(2) Convenience of written examinations

<table>
<tr><td></td><td>English (Written examination)</td><td>Department (Written examination)</td></tr>
<tr><td>Computer Science and Mathematical Informatics</td><td rowspan="5">For questions requiring translation from Japanese to English, hiragana will be printed beside each kanji. An English only dictionary may be used instead of a dictionary from English into your own native language.</td><td>May answer in English (Use of one dictionary allowed)</td></tr>
<tr><td>Information Engineering</td><td rowspan="4"></td></tr>
<tr><td>Media Science</td></tr>
<tr><td>Complex Systems Science</td></tr>
<tr><td>Systems and Social Informatics</td></tr>
</table>

11. Other Points of Notes

(1) If you have any questions about admissions to our Graduate School, such as application qualifications or documents and selection process, please inquire in advance at the office below.
(2) For details of research activities of professors/researchers, visit our website.
http://www.is.nagoya-u.ac.jp/
(3) Since Nagoya University restricts vehicle entry on to the campus, use public transportation when visiting the University for examinations.
(4) For information (Q&A) regarding admission, you may refer to: http://www.is.nagoya-u.ac.jp/exam-q-and-a.html
(5) Among unsuccessful applicants, those who so wish may learn the results of the examinations by subject.
Application period : February 27 (Mon.), 2006 and March 8 (Wed.) from 10:00 to 16:00. (Except for Saturday, Sunday and Holidays)
Application method : Use the form for "Request for Entrance Examination Results" prescribed by our Graduate School.

Academic & Students Affairs Section
Graduate School of Information Science, Nagoya University
Furo-cho, Chigusa-ku, Nagoya City, Aichi Prefecture
464-8601
Tel. +81-52-789-4721
http://www.is.nagoya-u.ac.jp/
E-mail: admission@is.nagoya-u.ac.up

Those who submit application forms on the basis of (8)

1. Qualifications for Application

Persons who have completed or will complete more than 3 years at university by March 31, 2006 or those who have completed 15 years of education at an educational system in a foreign country or enrolled in a foreign university in Japan, which is approved by the foreign country's school education system as an educational establishment (the applicants must be recognized to have completed 15 years in an educational system), and have completed a specific course of study and have been approved by the Graduate School as having excellent results of the required credits.

2. Examination of Qualification

2.1 Documents to be submitted

Those who submit application forms on the basis of (8) must send the following documents by no later than December 21 (Wed.) 4 p.m., 2005, address it to the Academic & Students Affairs Section (kyomu-gakusei-gakari) of the Graduate School of Information Science and bring it in person or send it by registered mail (write on the front side of the envelope in red "Application for Preliminary Examination of First Stage of the Graduate School") to a check whether the applicant has the necessary qualifications.

(1) Application for Preliminary Examination (Complete the form prescribed by our Graduate School and stamp it with the applicant's seal)
(2) Personal History (Complete the form prescribed by our Graduate School and stamp it with the applicant's seal)
(3) Official transcript of academic records (which includes the records up until the first semester of the 3rd year at the university at which the applicant is currently enrolled)
(4) Letter of Recommendation from the applicant's seminar professor/researcher of the university currently enrolled (no fixed form/Japanese or English)

2.2 Result of Examination of Qualification

The examination of qualifications will be carried out in our Graduate School and the result will be communicated to the applicant three days before the application period begins.

3. Examination and Documents to be submitted

3.1 The first selection

Application documents : Those applicants who were considered as qualified to apply must submit all the documents cited in the above Application Guidelines "4. Application Documents" except for "(4) Personal History," "(8)Certificate for graduation etc." and "(9) Official transcript of academic records."

Conditions for admission: Applicants must produce excellent results in the regular examinations for our Graduate School including both written and oral examinations and other procedures that are exactly the same as other applicants.

3.2 The second selection

Application Documents : Transcript of academic records of the third year of the university of the applicants by March 5 (if the date falls on a Saturday or Sunday, one day before) of the year of enrollment in our Graduate School.

Conditions for admission: The following two conditions must be satisfied. Even if the applicant is successful in the first selection: without satisfying the second selection's conditions, admission is not accepted.

(1) The applicant must have completed more than three quarters of the requisite credits for graduation by the end of the third year. (Optional courses are not acceptable.)
(2) Out of the credits the applicant has obtained, s/he must have "Excellent" (or A) in more than 70% of their academic records. (Optional courses and those courses that are evaluated only by pass/fail procedures are not counted as part of the number of credits of Excellent (or A).

Nagoya University Graduate School of Information Science

● Outline

Recent information technology development has a profound influence in a wide range of fields covering human life, culture, art, science and economics. It has also changed our society greatly. The highly information-oriented society is under construction and is supported by both theories of information processing and telecommunications. Today the world is going through a so-called information technology revolution, which demands fast and furious changes in social structure and social organization. In this modern society, it is acknowledged that “information” regulates how a society should be, and dominates human intellectual activities.

Information is a factor in human society which is as important as material objects and energy. In various fields of study, such as engineering, natural sciences, humanities, social sciences and arts, it enables us to recognize, understand and communicate modern society’s phenomena by abstracting their essence. Information technology is indispensable in all aspects of the planning, construction, and operation of systems in our daily life. It is also a technology with which to generate and identify, process and interpret, control and maintain information itself. Demand for social information technology is increasing constantly. Information science, which places information technology central to all information activities in humans, society and nature, needs to be prepared and developed, and society as a whole awaits its effect.

In our Graduate School, “Information Science” which integrated and collaborated different disciplines that had some relation with information supply needed to be promoted as a comprehensive discipline to respond to the needs of modern society. From the aspect of education, it is necessary to prepare an environment in which such human resources are nurtured, who could act as leaders and take responsibility for the construction of a discipline essential to the highly information-oriented society.

Taking these situations into consideration, it is necessary to develop specialists in the advanced information technology field, who can create a highly information-intensive society; to this end the Graduate School of Information Science was established at our university in April 2003.

● Degree

In the first stage of the doctorate course in our Graduate School, those who have completed requisite studies will be awarded the degree Master of Information Science. However, under certain circumstances, Master of Engineering or Master of Arts could also be awarded.

● Outline of Departments

Our Graduate School comprises the Department of Computer Science and Mathematical Informatics, Department of Information Engineering, Department of Media Science, Department of Complex Systems Science and Department of Systems and Social Informatics. In regard to the names and contacts of professors and researchers in respective departments, please refer to http://www.is.nagoya-u.ac.jp/

1) Department of Computer Science and Mathematical Informatics

Our Department conducts study and research in the basic domain of Computer Science including design, analysis and efficiency in information processing, as well as in the domain of Mathematical Informatics, which aims to apply information-related domains through construction and analysis of mathematical models of various phenomena.

The nucleus of our Department consists of the basic domain of Computer Science including Algorithm Theory, Computation Theory, Logical Representation of Knowledge, Mathematical Science related to Information Science especially applications to study of algebra and its application to coding theory and cryptography, mathematical logic and computation theory, quantum computing theory, construction of mathematical models and research of numerical analysis, and the domain of probability analysis and its application to information theory.

In brief, in our Department, selected scholars are nurtured as highly specialized engineers and researchers in Basic Information Science.

Divisions	Outline
Basics on Mathematical Informatics Theory	Basics on Mathematical Informatics Theory is indispensable to encourage progress and fresh development of information science. In this course, education and research will be undertaken to solve mathematical problems including logical structure of information, algebraic structure, and the computer's basic features using mathematical methodology of mathematical logic, algebra, analysis, probability theory and statistics.
Information Mathematics Models	In this course education and research will be undertaken in the construction of mathematical models for phenomena in nature and society, which develop in terms of time and space as well as mathematical solutions on challenges related to mathematical analysis of generation, communication and accumulation of information. Furthermore, to realize these in computer-based work, mathematical and computational tools will be developed and analyzed.
Computing Theory	Education and research will be carried out on theoretical computer science which covers theory of algorithms and computational complexity as well as logic, semantics and programming. In concrete terms, the course covers graph algorithms, approximation algorithms, parallel/distributed algorithms, computational geometry and cryptography as well as formal models such as computational models, formal semantics and automatic theorem proving.

2) Department of Information Engineering

In this department, we study and research optimal hardware and software for user-friendly and secure information systems by using information engineering methodology. We concern ourselves with the design and development of such information engineering systems.
Furthermore, based upon the experience of study and research in our Department if Information Engineering, formerly in the Faculty of Engineering, which accommodating the remarkable development of semiconductor integrated circuit technology and information communication technology, we aim to create further developments in information engineering.
Through the development of semiconductor integrated circuit technology, compact size information systems and integrated systems are embedded in machinery such as home electrical appliances and automobiles. Such information processing machinery is, in turn, connected to a mega-sized information system, and can be used in the mobile environment. As a result the software architecture which underpins the information system being constructed becomes larger and more complex.
In this department, by providing education and study of principles and technology, which can be applied to the design and construction of information systems for the next generation, we hope to nurture specialists who will be able to take leading roles as highly advanced information engineers and scientists.

Divisions	Outline
Integrated Circuits and Systems	Integrated systems embedded in various devices such as home electrical appliances are used in daily life and demand high dependability and real-time property as well as severe constraint on cost. Its development indispensably requires co-design and concurrent design of hardware and software, and new development principles and methodology are necessary. In this course, education and study will be carried out in integrated system design, CAD, processor architecture and real-time operating systems, which are the nucleus of any integrated system.
Software Science and Technology	In constructing an information system, and having clarified the requirement of the system by analysis and specification, large-scale and complex software needs to be developed swiftly with precision. Furthermore, taking the advances of software and hardware technology into consideration, it is very important to propose and realize information systems that will be the bases of new social infrastructure. In this course, software science and technology will be studied in both theoretical and practical aspects to develop highly reliable and efficient software as well as to handle large volumes of data with precision, high speed and safety. In addition, in the mobile environment, we will study methods to enable effective use of PDAs (personal digital assistance) and means of information exchange between PDAs.
Information Network Systems	In the design of an information network that links various information processing devices composing information systems, we have to select the optimum equipment of communication from amoung various ones, and have to develop a communication method using it which enables efficient and secure communication. . We also have to develop algorithms, as well as methods for synchronization and communication between computing units, for effective computation on a computational grid. In this course, education and research will cover such subjects as organization of information networks, information security, intelligent information search, large-scale data analysis, ultra-distributed/parallel processing methods.

3) Department of Media Science

Information plays a major role in various human activities in industry, economy, society, education, art, medicine/social welfare, and the home. In such an information-based society, information needs to be produced and expressed swiftly with precision.
In this Department, we are in the core of the 21st Century "Intelligent Media (Speech and Images) Integration for Social Information Infrastructure"; it is necessary to collaborate with Center for Integrated Acoustic Information Research which aims to integrated comprehension of multi-dimensional acoustic signals from the viewpoint of multi-faced aspects such as signal structure, information conversion, linguistics, spatial physics and cognitive approach. Media science will be advanced as a trinity of basic science, engineering and cognitive science.
In this Department, our purpose is to study and research the basics of media science, the creation of intelligent machinery which process and express media, and to study ways to clarify the recognition function of human beings that are indispensable in developing a functional information society, and eventually hope to nurture competent media scientists and media engineers.

Divisions	Outline
Science of Speech and Images	Study and research will be carried out on mathematics of pattern information processing, image processing, sound signal processing, image space generation, speech/sound space generation, image recognition, speech recognition, natural language processing and multi-modal information expression. Through this study, we will be able to deepen our understanding of processing and by multimedia – speech and images – computation, the basic theory of multi-media information generation, methodologies of processing/conversion/recognition of multimedia such as speech/images, and express/generate information through multi-media.
Intelligent Media Engineering	In this course we undertake study and research on computer vision, computer audition, natural language generation, censor fusion, idea support technology, ultra-realism creation, intellectual human interface. Through such learning, we will be able to deepen our understanding of methodologies to realize intelligent media such as intellectual agents including intelligent recognizing machines, and intelligent robots' sensing that support various human activities such as design/medicine/ education/communication and its application to industry, medical welfare and education sector.
Cognitive Information Theory	In this course through studying research on integrated perception in a multi-modal environment, recognition process and memory of speech/language, its cause, process of discovery/creation, and language acquisition and understanding process, we will undertake research on the environment which is most effective for communication and creation as well as the method and system of language acquisition. This will in turn lead us to study further experimental and biological (brain/imaging) methodology, being an high-level cognitive process of human perception, memory, discovery and creation. Through such research, we will attempt to deepen our understanding by computer science methodology, its modeling, various functions such as human perception/recognition, memory, language and thinking and the unraveling of effects of human function modules and actual modeling. Furthermore, since audio-visual art such as fine art/music accounts for much of human life, we will continue our study into information processing/expression methodologies of human sensitivity, and seek the enlargement of sensitivity domains and possibility of creation, and emotional information search.
Information Media Space Organization Theory	Since it is indispensable to develop an information environment for supporting or enlarging human intellectual activities in fields such as education, research, development and art, it is necessary to undertake study and research on information media space organization which describes information via multimedia, enlargement and creation methods of the intellectual world, and organization methods of the multi-modal interface which facilitates communication with information space.

4) Complex Systems Science

Complex systems in nature and society comprise the network of many and varied elements such as molecules, neurons, agents which can communicate, convert and accumulate information, and which can therefore be understood as a distributive information system. A main feature of such complex systems is to generate dynamically and autonomously an order structure and function, which cannot be expected from the basic component's features.
Complex systems science, by deeming self-organization process of such order and function as information processing, aims to acquire a universal viewpoint. The objective is to investigate various natural and artificial systems and through synthesizing theories, experiments and computation methods, we will attempt to clarify the principle of universal information processing, which is hidden in varied objects.
In this course, we will study the development of innovative computation methodologies to analyze complex systems without using established reductionist methodology, but we will develop constructive method by "understanding by creating" model systems. By opening up distributive methodology which designs information systems based on self-organization of distributed elements, we hope to nurture engineers and scientists who are able to initiate new ideas through using organization theory thinking and distributive thinking.

Divisions	Outline
Multi-liberal System Information Theory	Complex systems in nature are autonomous cooperative systems that operate as aggregates in which many organization elements interact. To understand the information structure of such a system, it is important to understand the characteristics of the aggregates that interact among many groups with different degrees of freedom. In this course, we focus on communication, conversion and accumulation of information interacting among Many body systems and investigate new principles of information science from the viewpoint of information physics. Furthermore, obtained statistical results will be applied to the analysis of group information phenomena in nature and society.
Material Information Theory	Material base that assumes communication, conversion and accumulation of information in nature is movement, reaction and structure of its molecules and collective entities. This course aims to analyze the information flow in complex molecule phenomena, which is integrated and organized into function discovery, and by using simulation, Many body system, algorithm development and Non-equilibrium theory and plastic dynamics, principles that design and create, we will inquire into the creation of information function material, and carry out studies on material-based information processing. Furthermore, research will be carried out on innovative information technology related to the simulation of molecule systems such as the development of ultra-parallel computation and special computers for dynamics.
Life Information Theory	A living organic body comprised of molecules, cells and tissues shares information. It can be said that it is a distributive information system that communicates a lot of information for the mutual benefit of control and maintenance. Furthermore, its relationship is a hierarchical information system formed in a complex manner between matter and species. In this course, an organization/process related to communication, conversion, increase, and accumulation of wide-ranged life information is understood as dynamic change of bioactive natural product into various living molecules such as nucleic acid and protein, which will be clarified through experiments such as synthetic organic chemistry, bioorganic chemistry, molecular function analysis and molecular biology. Study and research will be in the field of new bioinformatics.

Divisions	Outline
Emergent Systems Theory	Emergent phenomenon comprise the core concept that characterizes complex systems. The emergent phenomenon is the autonomous emergence of information process function, information process structure and information dynamics, which are based on dynamic interaction among many components. In this course, we aim to educate and study the understanding and application of emergent phenomenon in complex systems. To this end it is necessary to inquire into emergent phenomenon information organization, which is based on the construction of a computation theory model, realization of complex systems simulation, and its verification and application in the real world. Thus we will study and undertake research into the establishment of new principles of information processing.
Complex Systems Computation Theory	Non-linear dynamic systems and activities that humans carry out in natural science such as production activities is accepted as complex systems, and by constructing a mathematical model, and by numeric simulation, the model is verified and optimized. This should help clarify communication, conversion and accumulation mechanisms of information in complex systems. Thus, complex systems including forecast and control/design methods as well as higher precision/high-speed solution is developed. This will lead to the construction of new information process principle/information process system and hence we will undertake studies and research into computer theory in complex systems informatics.
Information Visualization Theory	Setting physical phenomena and dynamic interaction which shows non-linear behavior as the objective, large-scale computation and high-precision measurement and analysis is carried out. We aim to construct complex systems informatics that can extract useful information from spatiotemporal phenomena. For example, to extract necessary information and clarify it from Flow system that shows complex behavior, or from various massive data in the interaction between ecology/environment systems and humans, visualizations, discovery science and knowledge processing will be studied.

5) Department of Systems and Social Informatics

In this Department, the social environment in which development of information technology enhances an information-intensive society, our research takes the viewpoint of physical matter/phenomena of the real world and fusion of logical objectives/processes. The study will be focused on environment, organization, and function which are cooperatively and complementarily fusion-capable and which are organized by the real world and virtual world that is superior for human society. Paradigm or model that fosters, creates and educates humans as well as that which is related to the construction of activity space supported by human wisdom and creative action is already established. Therefore, we would like to explore construction and architecture of a social system that is knowledge-dependent through the use of information technology, and for another, we would like to evaluate and consider the various problems that are generated in the social environment and social organization through the development of information technology. This will lead to research into the human role and organization of human society in an integrated space between the real world and virtual world.

In this course, from the standpoint of nurturing human resources that can meet the needs of the information age, we would like to raise for the awareness of the importance of information processing education, information technology development/application, functional design/development of social information systems, databases for social information environment, and development/construction of a user interface. Thus, we aim to educate competent personnel who can actively support and develop the information society.

Divisions	Outline
Knowledge Society system Theory	Human intellectual activities are supported by repetition of knowledge generation, refining, integration and fomentation, and each develops into new activities. In an information-oriented society in which knowledge is the basis, it is necessary to address any information model that assists human intellectual activities, knowledge control/management architecture and any social information system that claims to realize all these. In this course, from the standpoint of the fusing/matching of the real world and virtual world, we will study the knowledge-oriented society system that can most effectively assist human activity space. Furthermore, in the virtual space that develops in the information-oriented society, handling of intellectual property becomes an important challenge. It is necessary to secure quality intellectual property and its distribution. We will also study its management/application from a technological viewpoint.
Electronic Society Design Theory	Extended dissemination of the Internet and Intranet and its penetration into social systems has realized various mechanisms of the real world as in a virtual world. Accordingly human life space and social environment is being transformed on a large-scale. In this course, we will reconsider the system of the real society, and use information formation processes for the modeling of electronic systems. Furthermore, research will be on construction and design methodology of the social information system and its contents in the fields of education, administration, museums and images. In addition, taking into account communication system design in an electronic-intensive-dependent society, research will be carried out on information design and usability, visual literacy and public art that is linked to computerization.
Information Creation Theory	Approach to information, heretofore, focused on efficient communication of existing information, and its primary concern was the application of computerized information processes to individual sciences, and hence the standpoint taken was from that of basic thinking. In this course, to form an approach that goes beyond that, we try not only sending communication via information but also establishing various settings where information is to be created. While clarifying the common factor, we would like to delve deeper into the significance and value of what is happening and what it means for human life, through philosophical studies taking history of thought into consideration. Furthermore, we accept the problem of information ethics that takes place in the encounter between “pursuit of information communication efficiency” and “study of information creation”, aiming to expand such discussions.
Infrastructure Environment of Information-Oriented Society Theory	In environmental activities, which take place in the setting where virtual space and real space become fused, which is the result of an information-oriented society, actions which have different values from the one real world are constructing new situations. In this course we will explore the criteria for intellectual significance and value standards, which should be the role model of human action that is evolved in the information-oriented society. We aim to establish an organization that will lead to the creation of principles in information space and information environment design as well as a framework for intellectual systems. Our research will be on a social environment infrastructure system which is brought about by the formation of an information setting where use/management/construction of information is integrated, including situation recognition/comprehension/composition/distributive technology as well as social state infrastructure design, and semantics of expression of action. There will be instruction on intellectual artificial organization methods among humans who have interactive ability. This will lead to the nurturing of scientists and engineers who can create a social environment infrastructure that supports new communication styles.