

For entrants in AY 2023

Appended Form 1

Specifications for the Major Program

Name of School(Program) School of Informatics and Data Science(Informatics and Data Science)

Program name (Japanese)	
English	Intelligence Science Program

1. Degree to be obtained:

Bachelor of Science in Informatics and Data Science

2. Overview

Because the complexity of economics, society, and the environment is increasing due to rapid globalization, people with the ability to identify problems and find solutions on their own have become indispensable for various organizations. In addition, it is urgently required to develop people capable of efficiently processing and analyzing huge amounts of information and data, so-called "big data", and of developing strategies and plans for their organizations based on evidence. The educational program in the School of Information Science consists of three programs, "Computer Science Program," "Data Science Program," and "Intelligence Science Program," and aims to develop specialists who have profound knowledge and understanding for each specialized area, in addition to the basic knowledge and skills in the three programs.

The data/network environment in contemporary society has been rapidly developed. In particular, the amount of data is swelling rapidly (big data), data is becoming more heterogenic and increasing in variety (qualitative/quantitative data, audio, images, movies, documents, graph structures, etc.), and the travel distance and speed of data are dramatically expanding. In today's information science education, it is required to develop various abilities, such as advanced information processing technologies based on basic knowledge of computer science and programming, technologies for collecting, processing, and analyzing various data acquired through specialized knowledge of mathematics and statistics, and advanced technologies that lead to new knowledge creation and innovation to solve problems that mankind has not been able to solve in the past, as represented by artificial intelligence.

However, it is difficult to develop specialists in information science, which is currently required in many fields, by providing only superficial knowledge and skills commonly required in "Computer Science", "Data Science", and "Intelligence Science". This program aims to develop specialists with diversity who can sufficiently exercise their profound understanding and abilities in areas of "Computer Science", "Data Science," and "Intelligence Science," based on a hybrid background across the three major academic fields.

In this program, in the first year, all students take higher mathematics such as algebra and analysis,

information mathematics, probability and statistics, and programming courses as the basis of information science. From the second year, students are assigned to one of three programs according to their interests and aptitudes. In each program, basic specialized subjects essential for professional education are required, and specialized subjects that are assigned to be taken in order to further broaden

This school educates students to become specialists with advanced capabilities in each of computer science, data science and intelligence science, as well as the basic abilities that consist of processing techniques based on the information technology, which are the basis of the information-intensive society of today, as well as advanced data analysis capabilities. In addition, this school aims to develop people who are capable of appropriately managing, processing, and analyzing information that has swelled significantly, and become complicated, due to such phenomena as the accumulation of big data, technological breakthroughs in fields related to artificial intelligence (AI), and the development of the IoT.

This school will award the degree of Bachelor of Science in Informatics and Data Science to students who have acquired the knowledge and abilities described below, and earned the required credits defined for the educational course. The diploma policy of the department of information science, faculty of information science, which is common to all program, is as follows.

To evenly acquire the skills related to the development of an information infrastructure, information processing techniques, and technology for producing new added value through data analysis.

To acquire the ability to identify and solve new problems on their own by quantitative and logical thinking based on data, diverse perspectives, and advanced skills for information processing and analysis.

To acquire the ability for reading and logical writing in English, capabilities required for giving a good, clear oral presentation, and documentation and communication.

Achievement target E. Creative and logical thinking ability for analyzing practical issues and challenges in order to provide rational solutions that match social needs, as well as the capability to realize these solutions.

4. Curriculum policy (policy for arranging and implementing the curriculum)

To enable students to achieve the targets that are defined for the school, the curricula are systematically organized as three educational programs, and implemented as advanced education based on the characteristics of each field. The curriculum policy of the department of information science, faculty of information science, which is common to all programs, is as follows.

In the first academic year, students take such subjects as peace science subjects and foreign language subjects in order to develop deep humanity, flexibility, and profound intelligence to foster the basic qualifications and abilities in

and implemented according to the policies described below. Academic achievement is evaluated based on the grade scores for the subjects and the level of achievement against the target defined for this program.

In the first academic year, students take peace science courses (academic target C1), basic courses in university education (target C1 and E), common subjects (foreign languages and health and sports courses; target C1 and C2), basic subjects (mathematics, statistics, and programming; target A and B); as liberal arts education subjects and a part of specialized subjects.

In the second academic year, all students take programming subjects and fundamental subjects in intelligence science, computer science, and data science (achievement target A, B, C1, D1, D2, D) to acquire the knowledge and skills that form the foundation of intelligence science.

In the third academic year, students take practical English subjects (academic target C2) to cultivate the ability to work in an increasingly globalized international society. In addition, students take informatics and data science, exercises (target A, B, D2, D3), thereby acquiring skills related to intelligence science by fostering pragmatic ability in designing machine learning programming and practical ability in media processing analysis based on real data through. Furthermore, in the intelligence science program, students take advanced subjects of artificial intelligence and machine learning, natural language processing, visual computing, human computer interaction, and others, to acquire the professional ability required in artificial intelligence era.

In the fourth academic year, students prepare their graduation thesis or engage in long-term fieldwork, using capabilities corresponding to the achievement targets A to E that they have acquired in the intelligence science program. The thesis or fieldwork is evaluated against the achievement targets A to E based on its degree of achievement and the presentation given at the presentation assembly.

5. Start time and acceptance conditions

In this program, students are assigned to a program at the end of the first year, and at the end of the second year, students are required to choose one of the following model courses: "Basic Model Course", "Integrated Model Course" or "Practical Model Course".

6. Obtainable qualifications

Educational personnel certification (Information teaching and Mathematics) is awarded to students who earns the required credits.

7. Class subjects and their contents

For class subjects, refer to the subject table in Attachment 1. (The subject table is to be attached.)

For the details of the class subjects, refer to the syllabus that is published each academic year.

8. Academic Achievement

The evaluation criteria are specified for each evaluation item for academic achievement, and the achievement level against the criteria is designated at the end of the semester.

The evaluation score for each evaluation item is converted to a numerical value (S = 4, A = 3, B = 2, and C = 1) and the evaluation standard for academic achievement, from when the student entered the university to the end of the last semester, is determined using these values while applying weightings. The evaluation standards consist of three levels, i.e. Excellent, Very Good, and Good.

Academic achievement	Evaluation standard
Excellent	3.00 - 4.00
Very Good	2.00 - 2.99
Good	1.00 - 1.99

Achievement evaluation	Numerical conversion
S (Excellent: 90 or more points)	4
A (Very good: 80 - 89 points)	3
B (Good: 70 - 79 points)	2
C (Passed: 60 - 69 points)	1

Refer to the relationship between evaluation items and evaluation criteria described in Attachment 2.

Refer to the relationship between evaluation items and class subjects described in Attachment 3.

Refer to the curriculum map in Attachment 4.

9. Graduation thesis (graduation research) (meaning, student allocation, timing, etc.)

A YU]b[

Graduation Thesis is a comprehensive subject in which students utilize the specialized knowledge, skills, and abilities that they have acquired in the Intelligence Science Program to pursue an advanced research topic. To take this subject, therefore, they are required to have not only knowledge of the specialized area but also an ability for research planning, a positive attitude, a cooperative mindset, and the capacity for continuous effort. This program educates students in Basic Model Course or Integrated Model Course to comprehensively improve these capabilities in order to allow them to acquire the ability to identify and solve new problems on their own. Detailed objectives are as follows:

1. To acquire the ability to develop a research plan for their research objective on their own, and to carry out their research according to that plan.
2. To develop skills for collecting materials related to the research objective, understanding the objective, and identifying problems.
3. To develop capabilities for analyzing problems related to the research objective and providing solutions that match social needs.
4. To develop skills required for research activity related to reading, writing, and searching for information in English.
5. To develop documentation skills for organizing research results and describing the meaning and efficacy of the obtained results in logical and consistent text.
6. To develop presentation skills for delivering the research results clearly and orally, and

communication skills for active discussion.

On the other hand, Students in Practical Model Course take the “Long-term fieldwork I” and “Long-term fieldwork II” instead of the graduation thesis, and participate in research and development projects and field surveys in companies which are specified by the department. This course cultivates the ability to understand practical issues that are being addressed in the real world and to solve those issues. Detailed objectives are as follows:

1. To acquire the ability to understand a given research question and to carry out their research according to research plan specified in the project.
2. To develop the knowledge and skills for solving the problems by understanding the materials and methodologies related to the research problem.
3. To develop capabilities for analyzing problems related to the research objective and providing solutions that match project needs.
4. To develop skills required for research activity related to reading, writing, and searching for information in English.
5. To develop documentation skills for organizing research results and describing the meaning and efficacy of the obtained results in logical and consistent text.
6. To develop presentation skills for delivering the research results clearly and orally, and communication skills for active discussion.

Requirements for starting the research for graduation thesis are defined in the Student Handbook.

Students in their fourth or senior year, who satisfy the requirements for starting the research for their graduation thesis, are allocated to a laboratory according to their wishes. The allocation method will be explained to the students at a briefing session that will be held before the allocation process. For students to be allocated to laboratories, an assembly and/or open laboratory event is held in February or March to show the details of research topics.

10. Responsibility

(1) Responsibility for PDCA (plan, do, check, and act) cycle

This program is executed by faculty members who support the education in the School of Informatics and Data Science. The dean of School of Informatics and Data Science takes on the responsibility for implementation of the program. It is mainly the academic affairs committee of the Informatics and Data Science Program and academic affairs members elected by the program that reviews and makes decisions related to the processes of the PDCA cycle (plan, do, check, and act) in the council of the School of Informatics and Data Science (this is held, in principle, on the first Thursday of every month). In some cases, a working group may be organized according to direction by the dean of School in order to intensively work on a case. When it is required to consider and take some action in either of the program, members which are mainly engaged in the concerned course will take responsibility. In such a case, the dean of the school designates the person in charge.

(2) Evaluation of the program

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Are class subjects arranged appropriately, while considering the aims of study and education in this program? Are the contents of classes appropriate?

Have students, on average, achieved the level that is required of them?

Is the system for achieving an upward spiral in the program functioning according to an appropriate cycle?

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Each subject in the program is evaluated based on student evaluation of the classes and achievement evaluation results.

For evaluation of the upward spiral in quality of the program, questionnaires for students are conducted in an appropriate cycle, and the opinions of ex-students and companies are collected.

Dc`JWbXa Yh`cX'Zf`ZYXUW`hc`gh`XYbhg

For individual classes, the faculty member who is in charge of the class makes comments on the evaluation of the class and the achievement evaluation results.

Actions taken, such as changes to the lecture and program structure, are published on the web site of School of Informatics and Data Science and/or another medium stating also the reason for the changes.

Academic Achievement in Educational Program for the Intelligence Science Program
The Relationship between Evaluation Items and Evaluation Criteria

Academic Achievements		Evaluation Criteria		
Evaluation Items		Excellent	Very Good	Good
Knowledge & understanding	(1) C1. Knowledge and ability to work on problem-solving after understanding that various issues existing in human beings, society, and individuals can be interpreted in multiple ways depending on social conditions and culture.	Have sufficient knowledge to fully understand the various problems and diversity of human beings, society, and individuals and how to address them.	Have standard knowledge for understanding various problems and the diversity of human beings, society, and individuals to a standard level and how to address them.	Understand various problems and diversity of human beings, society, and individuals to the minimum extent, and have the minimum knowledge to address them.
	(2) D1. A deep systematic understanding of the advanced intelligence of human beings and its realization by FR P S X W H U V	Have a deep systematic understanding of the advanced intelligence of human beings and its realization by computers.	Have a systematic understanding of the advanced intelligence of human beings and its realization by FR P S X W H U V	Have to understand the advanced intelligence of human beings and the realization by computers.
Ability & skills	(1) A. Information infrastructure development technology, information processing technology, technology that DQDO\JHV GDWD DQG FUHDWHV QH	Have sufficient knowledge to fully acquire and utilize information infrastructure development technology, information processing technology, and technology that FUHDWHV QHZ DGGHG YDOXH E\ D	Have standard knowledge to learn and utilize information infrastructure development technology, information processing technology, and technology that FUHDWHV QHZ DGGHG YDOXH E\ D	Have minimum knowledge to learn and utilize information infrastructure development technology, information processing technology, and technology that creates new added value by analyzing data to the PLQLXP GHWRQW
	(2) B. Ability to identify new problems independently and solve them through quantitative and logical thinking based on data, multifaceted perspectives, and DGYDQFHG LQIRUPDWLRQ SURFHV	Have sufficient knowledge to identify new problems independently and acquire sufficient abilities to solve problems through quantitative and logical thinking based on data, multifaceted perspectives, and advanced information processing and analysis.	Have standard knowledge to identify new problems independently and acquire standard abilities to solve problems through quantitative and logical thinking based on data, multifaceted perspectives, and DGYDQFHG LQIRUPDWLRQ SURFHV	Have minimum knowledge to identify new problems independently and acquire a minimum ability to solve problems through quantitative and logical thinking based on data, multifaceted perspectives, and advanced information processing and analysis.
	(3) D2. Information processing ability and data analysis ability to contribute to the application and GHYHORSHPHQW RI DUWLILFLDO LQ	One can fully acquire and utilize information processing ability and data analysis ability to contribute to the application and development of artificial intelligence and IoT.	One can acquire and utilize information processing ability and data analysis ability to contribute to the application and development of artificial intelligence DQG ,R7	One can acquire and utilize the minimum information processing ability and data analysis ability to contribute to the application and development of artificial intelligence and IoT.
Comprehensive capability	(1) C2. English conversation, reading, and writing skills are necessary for conducting research, good oral presentation skills, documentation skills for open discussion, and communication skills.	Have sufficient knowledge to fully acquire and utilize the communication, presentation, and documentation abilities related to English necessary for conducting research efficiently.	Have standard knowledge to acquire and utilize the communication, presentation, and documentation abilities related to English necessary for conducting UHVHDFK WR WKH VWDQG DUG O	Have minimum knowledge to acquire and utilize the communication, presentation, and documentation abilities related to English necessary for conducting research to the minimum level.
	(2) D3. Ability to grasp complexly intertwined social needs and issues from a bird's-eye view and solve issues with a multifaceted perspective and analytical ability based RQ D ZLGH UDQJH RI NQRZOHGJH	Have to acquire and utilize the sufficient ability to solve problems with a multifaceted perspective and analytical ability based on a wide range of knowledge of intelligent science by grasping the social needs and problems that exist in a comprehensive manner from a bird's-eye view.	Have to acquire and utilize the standard ability to grasp social needs and problems and solve problems with a multifaceted perspective and analytical ability based on a wide range of knowledge in intelligent VFLHQFH	Have to acquire and utilize the minimum ability to grasp social needs and problems and solve problems with a perspective and analytical ability based on the knowledge of intelligent science.
	(3) E. Creative and logical thinking ability to analyze practical problems/issues and derive rational solutions that meet the demands of society, and the ability to realize these solutions.	Have to acquire and utilize creative and logical thinking ability and sufficient ability to realize this solution to analyze practical problems and derive rational solutions that meet the demands of society.	Have to acquire and utilize creative and logical thinking ability and standard ability to realize this solution to analyze practical problems and derive rational solutions that meet the demands of society.	Have to acquire and utilize creative and logical thinking ability and the minimum ability to realize this solution to analyze practical problems and derive rational solutions that meet the demands of society.

Placement of the Liberal Arts Education in the Major Program

The liberal arts education in this program aims to build the academic foundation required for specialized education. Students take such subjects as a foreign language and disciplinary subjects to develop deep humanity, flexibility, and profound intelligence to foster the essential qualifications and abilities required for working globally in international society. In addition, they acquire the knowledge and skills that constitute the basis of specialized education in IXQGDPHQWDO VXEHHFWV VXFK DV 0DWKHPDWLFV DQG 6DWWLVVLFDO GDWD DQDO\VLV

Relationships between the Evaluation Items and Class Subjects

Subject Type	Class Subjects	Credits	Grade	Evaluation items														Total weighted values of evaluation items in the subject		
				Knowledge and Understanding				Abilities and Skills						Comprehensive Abilities						
				(1) C1		(2) D1		(1) A		(2) B		(3) D3		(1) C2		(2) D2			(3) E	
				Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items			
Liberal Arts Education	Introduction to University Education	2	1st grade	100	1														100	
Liberal Arts Education	Introductory Seminar for First-Year Students	2	1st grade	25	1			25	1	25	1							25	1	100
Liberal Arts Education	Peace Science Courses	2	1st grade	100	1															100
Liberal Arts Education	Area Courses	8	1st grade	100	1															100
Liberal Arts Education	Basic English Usage I	1	1st grade										100	1						100
Liberal Arts Education		1	1st grade										100	1						100
Liberal Arts Education		1	1st grade										100	1						100
Liberal Arts Education		1	1st grade										100	1						100
Liberal Arts Education		1	1st grade										100	1						100
Liberal Arts Education	Basic Foreign Languages I	2	1st grade										100	1						100
Liberal Arts Education		2	1st grade										100	1						100
Liberal Arts Education	Introduction to Information and Data Sciences	2	1st grade					50	1	50	1									100
Liberal Arts Education	Ground zero programming	2	1st grade					50	1	50	1									100
Liberal Arts Education	Health and Sports Course	2	1st grade	100	1															100
Liberal Arts Education	Elements of Calculus	2	1st grade					50	1	50	1									100
Liberal Arts Education	Seminar in Basic Mathematics I	1	1st grade					50	1	50	1									100
Liberal Arts Education		1	1st grade					50	1	50	1									100
Liberal Arts Education	Calculus I	2	1st grade					50	1	50	1									100
Liberal Arts Education		2	1st grade					50	1	50	1									100
Liberal Arts Education		2	1st grade					50	1	50	1									100
Liberal Arts Education		2	1st grade					50	1	50	1									100
Specialized Education	Discrete Mathematics I	2	1st grade					50	1	50	1									100
Specialized Education		2	1st grade					50	1	50	1									100
Specialized Education	Programming I	2	1st grade					50	1	50	1									100
Specialized Education		2	1st grade					50	1	50	1									100
Specialized Education		2	2nd grade					50	1	50	1									100
Specialized Education		2	2nd grade					50	1	50	1									100
Specialized Education	Theory of Automata and Languages	2	2nd grade			34	1	33	1	33	1									100
Specialized Education	Digital Circuit Design	2	2nd grade					33	1	33	1	34	1							100
Specialized Education	Programming Languages	2	2nd grade					33	1	33	1	34	1							100
Specialized Education	Algorithms and Data Structures	2	2nd grade					33	1	33	1				34	1				100
Specialized Education	Fundamentals of Probability Theory	2	1st grade					50	1	50	1									100
Specialized Education	Inferential Statistics	2	2nd grade			34	1	33	1	33	1									100
Specialized Education		2	2nd grade			34	1	33	1	33	1									100
Specialized Education	Statistical Test	2	2nd grade			34	1	33	1	33	1									100
Specialized Education	Stochastic Modeling	2	2nd grade									100	1							100
Specialized Education	Numerical Computation	2	2nd grade											100	1					100
Specialized Education	Mathematical Programming	2	2nd grade											100	1					100
Specialized Education	System Optimization	2	2nd grade											100	1					100
Specialized Education	Mathematical Analysis	2	2nd grade			50	1	50	1											100
Specialized Education	Multivariate Analysis	2	2nd grade			100	1													100
Specialized Education	Basic and practice in Categorical data analysis	2	2nd grade											100	1					100
Specialized Education	Mechanism how programs run on computer	2	2nd grade			100	Specialized Education	1981	1981	1981	1981	1981	1981							
		1	3rd grade											100	1					100
Specialized Education		1	3rd grade											100	1					100

