For entrants in AY 2018

Appended Form 1

Specifications for Major Program

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

Program name (Japanese)	情報科学プログラム
(English)	Informatics and Data Science Program

[illegible]
[illegible]
[illegible]

[illegible]

[illegible]

'[illegible]

'[illegible]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible] * [illegible]
[illegible]	[illegible] * [illegible]
[illegible]	[illegible] * [illegible]

[illegible]

[illegible]	[illegible]
[illegible]	[illegible]
[illegible] * [illegible]	[illegible]
[illegible] * [illegible]	[illegible]
[illegible] * [illegible]	[illegible]

'[illegible]

'[illegible]

'[illegible]

[illegible]

Table of Registration Standards for Liberal Arts Education Subjects
Informatics and Data Science Program

◎ Required subject (period of registration specified)
○ Compulsory elective subject (any of these subjects shall be registered)

Subject Type					Required No. of Credits	Class Subjects, etc.	No. of Credits	Type of Course Registration	Year in Which the Subject is Taken(*The lower figure means semester) (Note 1)													
									1st year				2nd year				3rd year				4th year			
									1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Liberal Arts Education Subjects	Peace Science Courses				2	Peace Science Courses	2	Compulsory elective		○														
	Common Subjects	Basic Courses in University Education			2	Introduction to University Education	2	Required	◎															
					2	Introductory Seminar for First-Year Students	2	Required	◎															
		Area Courses			8	4 credits from Courses in Arts and Humanities/Social Sc	2	Compulsory elective	○	○	○	○	○	○	○	○								
		Foreign Languages	English (Note 2・3)	Basic English Usage	2	Basic English UsageI	1	Required		◎														
						Basic English UsageII	1				◎													
				Communication I	2	Communication I A	1	Required		◎														
						Communication I B	1			◎														
				Communication II	2	Communication II A	1	Required			◎													
						Communication II B	1				◎													
				Communication III	2	Communication III A	1	Compulsory elective						○		○								
						Communication III B	1							○		○								
						Communication III C	1							○		○								
						Select two subjects from the three subjects above																		
			Initial Foreign Languages (Select one language from German, French and Chinese)		2	Two subjects from Basic language I	1	Compulsory elective		○														
		Health and Sports Courses			2		1or 2	Compulsory elective		○		○												
	Basic Subjects				12	Elements of Calculus (Note 4)	2	Compulsory elective		○														
						Seminar in Basic Mathematics I (Note4)	1			○														
						Seminar in Basic Mathematics II (Note4)	1					○												
						Statistical Data Analysis	2	Required		◎														
						CalculusI	2				◎													
						Calculus II	2					◎												
						Linear Algebra I	2				◎													
						Linear Algebra II	2					◎												
	No. of Credits Required for Graduation				38																			

Note 1: If a student failed to earn the credit in the term or semester indicated with the mark "　" or "　" in the column of "Academic year", it is allowed to take the subject in a following term or semester. It is required to confirm the semester in which the subject is provided in the class schedule for liberal arts education subjects that is published for every academic year, because some subjects might be provided in a term or semester other than that which is shown in this document.

Note 2: The credit for "Field Research in the English-speaking World" and that for "Online English Seminar A" and "Online English Seminar B", that are earned through a program of self-study, are not accepted as the credit for graduation. However, a credit for foreign language study abroad might be accepted as that for "Basic English Usage I", "Basic English Usage II", or "Basic English Usage III" based on advance application. For the details, refer to the description regarding English subjects in liberal arts education in the Students Handbook.

Note 3: Achievement in a foreign language skill test might be accepted as a credit. For the details, refer to the description regarding English subjects in liberal arts education in the Students Handbook.

Note 4: Students who took four mathematics subjects (Math I, Math II, Math A, and Math B) in the entrance examination are required to take the subject "Elements of Calculus." Students who took five mathematics subjects (Math I, Math II, Math III, Math A, and Math B) in the entrance examination are required to take the subjects "Seminar in Basic Mathematics I" and "Seminar in Basic Mathematics II."

Relationships between the Evaluation Items and Class Subjects

Subject Type	Class Subjects	Credits	Period	Evaluation items																					Total weighted values of evaluation items in the subject
				Knowledge and Understanding						Abilities and Skills								Comprehensive Abilities								
				(1) C1		(2) D1		(3) I1		(1) A		(2) B		(3) D2		(4) I3		(1) C2		(2) D3		(3) I2		(4) 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	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	1semester-1T	100	1																				100
Liberal Arts Education	Introductory Seminar for First-Year Students	2	1semester-1T	25	1					25	1	25	1											25	1	100
Liberal Arts Education	Peace Science Courses	2	1semester-2T	100	1																				100
Liberal Arts Education	Area Courses	8	1semester-1T	100	1																				100
Liberal Arts Education	Basic English UsageⅠ	1	1semester															100	1						100
Liberal Arts Education	Basic English Usage Ⅱ	1	2semester															100	1						100
Liberal Arts Education	Communication Ⅰ A	1	1semester															100	1						100
Liberal Arts Education	Communication Ⅰ B	1	1semester															100	1						100
Liberal Arts Education	Communication Ⅱ A	1	2semester															100	1						100
Liberal Arts Education	Communication Ⅱ B	1	2semester															100	1						100
Liberal Arts Education	CommunicationⅢA	1	3semester															100	1						100
Liberal Arts Education	CommunicationⅢB	1	3semester															100	1						100
Liberal Arts Education	CommunicationⅢC	1	3semester															100	1						100
Liberal Arts Education	Basic Foreign LanguagesⅠ	2	1semester															100	1						100
Liberal Arts Education	Health and Sports Subject	2	1semester	100	1																				100
Liberal Arts Education	Elements of Calculus	2	1semester-1T							50	1	50	1												100
Liberal Arts Education	Seminar in Basic Mathematics Ⅰ	1	1semester							50	1	50	1												100
Liberal Arts Education	Seminar in Basic Mathematics Ⅱ	1	2semester							50	1	50	1												100
Liberal Arts Education	Statistical Data Analysis	2	1semester-1T							50	1	50	1												100
Liberal Arts Education	CalculusⅠ	2	1semester-2T							50	1	50	1												100
Liberal Arts Education	CalculusⅡ	2	2semester-1T							50	1	50	1												100
Liberal Arts Education	Linear Algebra Ⅰ	2	1semester-2T							50	1	50	1												100
Liberal Arts Education	Linear Algebra Ⅱ	2	2semester-1T							50	1	50	1												100
Specialized Education	Discrete Mathematics Ⅰ	2	1semester-2T							50	1	50	1												100
Specialized Education	Discrete Mathematics Ⅱ	2	1semester-3T							50	1	50	1												100
Specialized Education	Programming Ⅰ	2	1semester							50	1	50	1												100
Specialized Education	Programming Ⅱ	2	2semester							50	1	50	1												100
Specialized Education	Programming Ⅲ	2	3semester							50	1	50	1												100
Specialized Education	Programming Ⅳ	2	4semester							50	1	50	1												100
Specialized Education	Theory of Automata and Languages	2	2semester-1T					34	1	33	1	33	1												100
Specialized Education	Digital Circuit Design	2	2semester-3T							33	1	33	1			34	1								100
Specialized Education	Programming Languages	2	2semester-4T							33	1	33	1			34	1								100
Specialized Education	Algorithms and Data Structures	2	2semester-3T							33	1	33	1									34	1		100
Specialized Education	Fundamentals of Probability Theory	2	1semester-4T			34	1			33	1	33	1												100
Specialized Education	Inferential Statistics	2	2semester-1T			34	1			33	1	33	1												100
Specialized Education	Linear Regression Model	2	2semester-2T			34	1			33	1	33	1												100
Specialized Education	Statistical Test	2	2semester-1T			34	1			33	1	33	1												100
Specialized Education	Generalized Linear Model	2	2semester-3T											100	1										100
Specialized Education	Stochastic Modeling	2	2semester-4T											100	1										100
Specialized Education	Numerical Computation	2	2semester-4T																			100	1		100
Specialized Education	Mathematical Programming	2	3semester																			100	1		100
Specialized Education	System Optimization	2	2semester-3T																			100	1		100
Specialized Education	Differential Equations	2	2semester-2T					100	1																100
Specialized Education	Fourier Analysis	2	2semester-4T					100	1																100
Specialized Education	Multivariate Analysis	2	2semester-3T			100	1																		100
Specialized Education	Basic and practice in Categorical data analysis	2	2semester-2T																	100	1				100
Specialized Education	Computer Architecture	2	2semester-4T													100	1								100
Specialized Education	Operating Systems	2	2semester-3T													100	1								100
Specialized Education	Databases	2	2semester-4T					100	1																100
Specialized Education	Software Engineering	2	2semester-2T																			100	1		100
Specialized Education	Information Theory	2	2semester-1T					100	1																100
Specialized Education	Practical English Ⅰ	1	3semester-1T															100	1						100
Specialized Education	Practical English Ⅱ	1	3semester-3T															100	1						100

				Evaluation items																						Values of : in the
				Knowledge and Understanding						Abilities and Skills								Comprehensive Abilities								
				(1) C1		(2) D1		(3) I1		(1) A		(2) B		(3) D2		(4) I3		(1) C2		(2) D3		(3) I2		(4) E		
Specialized Education	Informatics and data science, Exercise Ⅰ	1	3semester-1T							33	1	33	1			34	1									100
Specialized Education	Informatics and data science, Exercise Ⅱ	1	3semester-2T							33	1	33	1			34	1									100
Specialized Education	Informatics and data science, Exercise Ⅲ	1	3semester-3T			34	1			33	1	33	1													100
Specialized Education	Informatics and data science, Exercise Ⅳ	1	3semester-4T			34	1			33	1	33	1													100
Specialized Education	Theory of Computing	2	3semester-1T					50	1	50	1															100
Specialized Education	Image Processing	2	3semester-2T													100	1									100
Specialized Education	Visual Computing	2	3semester-3T													100	1									100
Specialized Education	Artificial Intelligence and Machine Learning	2	3semester-3T					100	1																	100
Specialized Education	Computer Network	2	3semester-4T							50	1					50	1									100
Specialized Education	Human Computer Interaction	2	3semester-3T													100	1									100
Specialized Education	Parallel and Distributed Processing	2	3semester-3T													100	1									100
Specialized Education	Software Management	2	3semester-2T																			100	1			100
Specialized Education	Natural Language Processing	2	3semester-2T					100	1																	100
Specialized Education	Information Society and Security	2	3semester-2T																			100	1			100
Specialized Education	Data Mining	2	3semester-1T			50	1			50	1															100
Specialized Education	Survey design	2	3semester-1T											100	1											100
Specialized Education	Nonparametric analysis	2	3semester-2T			50	1			50	1															100
Specialized Education	Big Data	2	3semester-4T							50	1									50	1					100
Specialized Education	Behaviormetrics	2	3semester-2T			100	1																			100
Specialized Education	Econometrics	2	3semester-2T																	100	1					100
Specialized Education	Time Series Analysis	2	3semester-3T											100	1											100
Specialized Education	Biostatistics	2	3semester-2T																	100	1					100
Specialized Education	Biomedical Statistics	2	3semester-3T																	100	1					100
Specialized Education	Stochastic Processes	2	3semester-4T																	100	1					100
Specialized Education	Financial Engineering	2	3semester-4T																	100	1					100
Specialized Education	Data Analysis for Medical and Welfare Policies	2	3semester-4T											100	1											100
Specialized Education	Society and Data Analysis	2	3semester-3T																	100	1					100
Specialized Education	Total Quality Management and Data Analysis	2	3semester-3T																	100	1					100
Specialized Education	Education Policy and Data Analysis	2	3semester-4T											100	1											100
Specialized Education	Data Science Seminar Ⅰ	1	4semester-1T			33	1							33	1					34	1					100
Specialized Education	Data Science Seminar Ⅱ	1	4semester-2T			33	1							33	1					34	1					100
Specialized Education	Informatics Seminar Ⅰ	1	4semester-1T					33	1							33	1					34	1			100
Specialized Education	Informatics Seminar Ⅱ	1	4semester-2T					33	1							33	1					34	1			100
Specialized Education	Graduation thesis	3	8 semester											50	1									50	1	100

Curriculum Map of Informatics and Data Science Program

	Academic Achievement Evaluation Itemas	1st year Spring	1st year Fall	2nd year Spring	2nd year Fall	3rd year Spring	3rd year Fall	4th year Spring	4th year Fall
Knowledge and Understandings	(1) C1. Knowledge and capabilities required for solving problems, while understanding that various problems of human beings, societies, and individuals can be interpreted in different ways according social conditions, cultures, etc.	(1T)Introduction to University Education (1T)Introductory Seminar for First-Year Students (1T)Area courses (1T)Health and Sports Courses (2T)Peace Science Courses							
	(2) D1. Knowledge and skills required for understanding the theoretical system of statistics and data analysis, and for precisely and efficiently analyzing qualitative/quantitative information in big data.		(4T)Fundamentals of Probability Theory	(1T)Inferential Statistics (1T)Statistical Test (2T)Linear Regression Model	(3T)Multivariate Analysis	(1T)Data Mining (2T)Nonparametric analysis (2T)Behaviormetrics	(3T)Informatics and data science, Exercise (4T)Informatics and data science, Exercise	(1T)Data Science Seminar I (2TData Science Seminar	
	(3) I1.Knowledge and ability required for collecting and processing high-dimensional data using information processing technologies based on scientific logic, while understanding the theoretical system that forms the basis of informatics			(1T)Theory of Automata and Languages (1T)Information Theory (2T)Differential Equations	(4T)Fourier Analysis (4T)Databases	(1T)Theory of Computing (2T)Natural Language Processing	(3T)Artificial Intelligence and Machine Learning	(1T)Informatics Seminar (2T)Informatics Seminar	
Abilities and Skills	(1) A. Skills related to the development of an information infrastructure, information processing techniques, and technology for producing new added value through data analysis.	Seminar in Mathematics Programming (1T)Elements of Calculus (1T)Introductory Seminar for First-Year Students (1T)Statistical Data Analysis (2T)Calculus (2T)Linear Algebra (2T)Discrete MathematicsI	Seminar in Mathematics Programming (3T)Calculus (3T)Linear Algebra (3T)Discrete MathematicsII (4T)Fundamentals of Probability Theory	Programming (1T)Theory of Automata and Languages (1T)Inferential Statistics (1T)Statistical Test (2T)Linear Regression Model	Programming (3T)Digital Circuit Design (3T)Algorithms and Data Structures (4T)Programming Languages	(1T)Informatics and data science, Exercise I (1T)Theory of Computing (1T)Data Mining (2T)Informatics and data science, Exercise (2T)Nonparametric analysis	(3T)Informatics and data science, Exercise (4T)Informatics and data science, Exercise (4T)Computer Network (4T)Big Data		
	(2) B. 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.	Seminar in Mathematics Programming (1T)Elements of Calculus (1T)Introductory Seminar for First-Year Students (1T)Statistical Data Analysis (2T)Calculus (2T)Linear Algebra (2T)Discrete MathematicsI	Seminar in Mathematics Programming (3T)Calculus (3T)Linear Algebra (3T)Discrete MathematicsII (4T)Fundamentals of Probability Theory	Programming (1T)Theory of Automata and Languages (1T)Inferential Statistics (1T)Statistical Test (2T)Linear Regression Model	Programming (3T)Digital Circuit Design (3T)Algorithms and Data Structures (4T)Programming Languages	(1T)Informatics and data science, Exercise (2T)Informatics and data science, Exercise	(3T)Informatics and data science, Exercise (4T)Informatics and data science, Exercise		
	(3) D2. Ability to develop strategies and plans for an organization based on statistical				(3T)Generalized Linear Model (4T)Stochastic Modeling	(1T)Survey design	(3T)Time Series Analysis (4T)Data Analysis for Medical and Welfare Policies (4T)Education Policy and Data Analysis	(1T)Data Science Seminar (2T)Data Science Seminar	

	evidence by using a wide range of knowledge and skills related to data science.									
	(4) I3. Knowledge related to hardware and software, and the programming skills required for efficiently processing data.				(3T)Digital Circuit Design	(1T)Informatics and data science, Exercise	(3T)Visual Computing	(1T)Informatics Seminar	
					(3T)Operating Systems	(2T)Informatics and data science, Exercise	(3T)Human Computer Interaction	(2T)Informatics Seminar	
					(4T)Programming Languages	(2T)Image Processing	(3T)Parallel and Distributed Processing		
					(4T)Computer Architecture		(4T)Computer Network		
Comprehensive Abilities	(1) C2. Skills for communication, reading, and writing in English, capabilities required for giving a good, clear oral presentation, and documentation and communication skills that contribute to active discussion.	Basic English Usage	Basic English Usage	Communication		(1T)Practical English I	(3T)Practical English		Graduation Thesis
		Communication	Communication	Communication					
		Communication	Communication	Communication					
		Basic Foreign Languages							
	(2) D3. Ability to examine social needs and issues which are interlinked in a complex manner, using a top-down view to solve the problems through quantitative and logical thinking based on data, diverse perspectives, and advanced skills in information processing and analysis.			(2T)Basic and practice in Categorical data analysis		(2T)Econometrics	(3T)Biomedical Statistics	(1T)Data Science Seminar	
						(2T)Biostatistics	(3T)Society and Data Analysis	(2T)Data Science Seminar	
							(3T)Total Quality Management and Data Analysis		
							(4T)Big Data		
							(4T)Stochastic Processes		
							(4T)Financial Engineering		
	(3) I2. Ability to provide the most appropriate system solution to a cross-sectional problem in the diversified and complicated information society based on the many forms of cutting edge information technology.			Mathematical Programming	(3T)Algorithms and Data Structures	(2T)Software Management		(1T)Informatics Seminar	
				(2T)Software Engineering	(3T)System Optimization	(2T)Information Society and Security		(2T)Informatics Seminar	
					(4T)Numerical Computation				
	(4) 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.	(1T)Introductory Seminar for First-Year Students							Graduation Thesis

Ex	Liberal Arts Education	Specialized Core Subject	Specialized Subjects Type of course registration in parenthesis is as Data Science and Informatics	Graduation Thesis