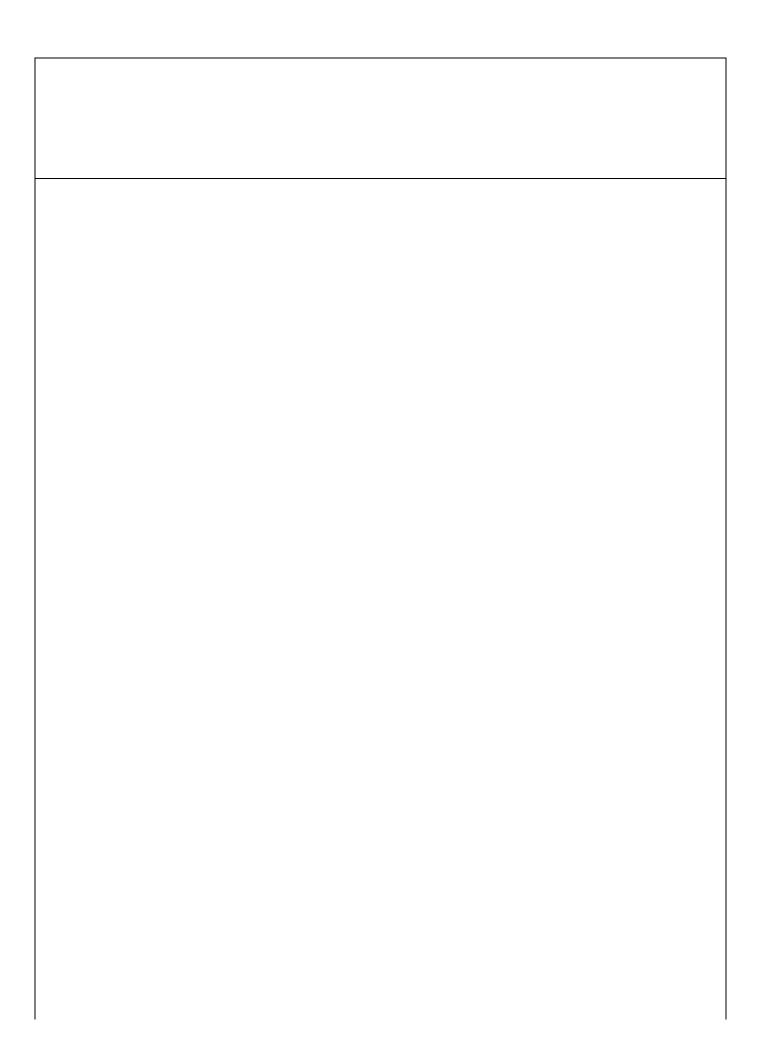
Appended Form 1

Specifications for Major Progra



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

 \odot Required subject (period of registration specified)

O Compulsory elective subject (any of these subjects shall be registered)

Required						ipuisory electr			Year ir					_					_								
		Subje	ct Type)	Required No. of	Class Subjects, etc.	No. of Credits	Type of Course Registration		1st	yea	r	2	2nd	yea	ır		3rd	yea	r	4	th :	yeaı	r			
					Credits		Credits	Registration	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
	P	eace Sc	cience (Courses	2	Peace Science Courses	2	Compulsory elective		С)																
	Basic Courses in	Introduction	n to Universi	ty Education	2	Introduction to University Education	2	Required	0																		
	University Education	Introductor	y Seminar fo	r First-Year Students	2	Introductory Seminar for First-Year Students	2	Required	0																		
					8	4 credits from Courses in Arts and Humanities/Social Sc	2	Compulsory elective	0	С	0	0	0	0	0	0											
				Basic English	2	Basic English UsageI	1	Required	0	9																	
				Usage	2	Basic English UsageII	1	rtequireu			(0															
				Communication	2	Communication I A	1	Required	0	9																	
	cts	70	- 0	I	Δ	Communication I B	1	Required	(9																	
cts	Common Subjects	Foreign Languages	English (Note 2·3)	Communication	2	Communication II A	1	Required			(0															
ıbje	ı Sı	ıgu	Eng Note	П		Communication II B	1	rtequireu			(0	1														
n St	mor	Lar				CommunicationIIIA	1 Compulsory								(Ċ											
ation	om	ign		Communication	2	Communication IIIB	1	Compulsory elective)		C											
duce)	ore		Ш		Communication III C	1)	(C											
s Ec		H				Select two subjects from t	the three	subjects above	•		•							•									
Liberal Arts Education Subjects			(Select or	oreign Languages ne language from French and	2	Two subjects from Basic language I	1	Compulsory elective	()																	
П		Health	and Sp	orts Courses	2		1or 2	Compulsory elective)	-)															
						Elements of Calculus (Note 4)	2		0																		
						Seminar in Basic Mathematics I (Note4)	Compulsory	Compulsory)														
						Seminar in Basic Mathematics II (Note4)	1	CICCUITO			-)															
		Dogi	c Subje	at a	12	Statistical Data Analysis	2		0																		
		Dasi	c Subje	cts	12	CalculusI	2			0)																
						Calculus II	2	Required			0																
						Linear Algebra I	2			0)																
					Linear Algebra II	2				0																	
	No. of Cree	dits Requ	uired 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 II" and "Seminar in Basic Mathematics II."

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Academic Achievement in Educational Program for Informatics and Data Science Program The Relationship between Evaluation Items and Evaluation Criteria

		Academic Achievements	Evaluation Criteria									
		Evaluation Items	Excellent	Very Good	Good							
nding	(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.	Fully understands various problems related to human beings, societies, and individuals and their variety, and has a sufficient level of knowledge required for solving these problems.	Understands various problems related to human beings, societies, and individuals and their variety at a standard level, and has a standard level of knowledge required for solving these problems.	Understands various problems related to human beings, societies, and individuals and their variety at a minimum level, and has a minimum level of knowledge required for solving these problems.							
Knowledge & understanding	(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.	Fully understands the theoretical system of statistics and data analysis, and has sufficient knowledge for precisely and efficiently analyzing big data.	Understands the theoretical system of statistics and data analysis at a standard level, and has a standard level of knowledge for precisely and efficiently analyzing big data.	Understands the theoretical system of statistics and data analysis at a minimum level, and has a minimum level of knowledge for precisely and efficiently analyzing big data.							
Kno	(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.	Has sufficient knowledge required for collecting and processing high-dimensional data using information processing technologies, while fully understanding the theoretical system of informatics.	Has a standard level of knowledge required for collecting and processing high-dimensional data using information processing technologies, while having a standard level of understanding on the theoretical system of informatics.	Has a minimum level of knowledge required for collecting and processing high-dimensional data using information processing technologies, while having a minimum level of understanding on the theoretical system of informatics.							
	(1)	A. Skills related to the development of an information infrastructure,information processing techniques, and technology for producing new added value through data analysis.	Has fully acquired skills and is capable of exercising them regarding the development of an information infrastructure, information processing techniques, and technology for producing new added value through data analysis.	Has acquired skills and is capable of exercising them at a standard level regarding the development of an information infrastructure,information processing techniques, and technology for producing new added value through data analysis.	Has acquired skills and is capable of exercising them at a minimum level regarding the development of an information infrastructure,information processing techniques, and technology for producing new added value through data analysis.							
& skills		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.	Has acquired a sufficient level of ability to identify and solve new problems their own by quantitative and logical thinking based on data, diverse perspectives, and advanced skills for information processing and analysis, and is capable of exercising this ability.	Has acquired a standard level of 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, and is capable of exercising this ability.	Has acquired a minimum level of 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, and is capable of exercising this ability.							
Ability		D2. Ability to develop strategies and plans for an organization based on statistical evidence by using a wide range of knowledge and skills related to data science.	Has acquired a sufficient level of ability to develop strategies and plans for an organization based on statistical evidence by using knowledge and skills related to data science, and is capable of exercising this ability.	Has acquired a standard level of ability to develop strategies and plans for an organization based on statistical evidence by using knowledge and skills related to data science, and is capable of exercising this ability.	Has acquired a minimum level of ability to develop strategies and plans for an organization based on statistical evidence by using knowledge and skills related to data science, and is capable of exercising this ability.							
	(4)	13. Knowledge related to hardware and software, and the programming skills required for efficiently processing data.	Has acquired knowledge regarding hardware and software, and the programming skills required for efficiently processing data at a sufficient leve,I and is capable of exercising these skills.	Has acquired knowledge regarding hardware and software, and the programming skills required for efficiently processing data at a standard level, and is capable of exercising these skills.	Has acquired knowledge regarding hardware and software, and the programming skills required for efficiently processing data at a minimum level, and is capable of exercising these skills.							

		Academic Achievements		Evaluation Criteria	
		Evaluation Items	Excellent	Very Good	Good
	(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.	Has acquired skills for communication in English, and the presentation and documentation skills required for research activities at a sufficient level, and is capable of exercising these skills.	Has acquired skills for communication in English, and the presentation and documentation skills required for research activities at a standard level, and is capable of exercising these skills.	Has acquired skills for communication in English, and the presentation and documentation skills required for research activities at a minimum level, and is capable of exercising these skills.
ive capability	(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.	Has acquired the ability to solve problems by quantitative and logical thinking based on data, diverse perspectives, and advanced skills for information analysis at a sufficient level, and is capable of exercising these skills.	Has acquired the ability to solve problems by quantitative and logical thinking based on data, diverse perspectives, and advanced skills for information analysis at a standard level, and is capable of exercising these skills.	Has acquired the ability to solve problems by quantitative and logical thinking based on data, diverse perspectives, and advanced skills for information analysis at a minimum level, and is capable of exercising these skills.
Comprehensiv	(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.	Has a sufficient level of ability to provide the most appropriate system solution to a cross-sectional problem in the information society based on the many forms of cutting edge information technology, and is able to exercise this ability.	Has a standard level of ability to provide the most appropriate system solution to a cross-sectional problem in the information society based on the many forms of cutting edge information technology, and is able to exercise this ability.	Has a minimum level of ability to provide the most appropriate system solution to a cross-sectional problem in the information society based on the many forms of cutting edge information technology, and is able to exercise this ability.
	(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.	and logical thinking required for analyzing practical issues and challenges to provide a rational solution	issues and challenges to provide a rational solution	Has acquired a minimum level of ability for creative and logical thinking required for analyzing practical issues and challenges to provide a rational solution that matches social needs, as well as the capabilities for realizing the solution, and is capable of exercising this ability.

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 the specialized education. Students take such subjects as foreign language subjects and disciplinary subjects in order to develop deep humanity, flexibility, and profound intelligence to foster the basic qualifications and abilities required for working globally in an international society. In addition, they acquire the knowledge and skills that constitute the basis of the specialized education in the fundamental subjects related to such things as mathematics and statistical data analysis.

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				g W	сь ав	g W	cb ag	g W	co ag	g W	co ag	g W	co ag	g W	св ак	g W	co ag	g W	co ag	cb ag b g W	сь ак	g W	cb ag	g W	cb ag	0
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	Basic English Usage II	1	1st grade															100	1							100
Liberal Arts Education	Communication I A	1	1st grade															100	1							100
Liberal Arts Education	Communication I B	1	1st grade															100	1							100
Liberal Arts Education	Communication II A	1	1st grade															100	1							100
Liberal Arts Education	Communication II B	1	1st grade															100	1							100
Liberal Arts Education	Communication III A	1	2nd grade															100	1							100
Liberal Arts Education	Communication IIIB	1	2nd grade															100	1							100
Liberal Arts Education	Communication III C	1	2nd grade															100	1							100
	Basic Foreign Languages I	2	1st grade															100	1							100
Liberal Arts Education	Basic Foreign Languages II	2	1st grade															100	1							100
Liberal Arts Education	Health and Sports Subject	2	1st grade		1													. 50								100
Liberal Arts Education	Elements of Calculus	2	1st grade							50	1	50	1									—				100
Liberal Arts Education	Seminar in Basic Mathematics I	1								50	1	50	1									—				100
Liberal Arts Education	Seminar in Basic Mathematics II	1	1st grade							50	1	50	1									\vdash				100
	Statistical Data Analysis		1st grade																			 				_
Liberal Arts Education	-	2	1st grade							50	1	50	1									\vdash				100
Liberal Arts Education	Calculus I	2	1st grade							50	1	50	1									\vdash				100
	CalculusI II	2	1st grade							50	1	50	1									├				100
Liberal Arts Education	Linear Algebra I	2	1st grade							50	1	50	1									├				100
Liberal Arts Education	Linear Algebra II	2	1st grade							50	1	50	1									₩				100
Specialized Education	Discrete Mathematics I	2	1st grade							50	1	50	1									—				100
Specialized Education	Discrete Mathematics II	2	1st grade							50	1	50	1									Ь—				100
Specialized Education	Programming I	2	1st grade							50	1	50	1									Ь—				100
Specialized Education	Programming II	2	1st grade							50	1	50	1									Ь—				100
Specialized Education	Programming III	2	2nd grade							50	1	50	1									<u> </u>				100
Specialized Education	Programming IV	2	2nd grade							50	1	50	1									<u> </u>				100
Specialized Education	Theory of Automata and Languages	2	2nd grade					34	1	33	1	33	1									<u> </u>				100
Specialized Education	Digital Circuit Design	2	2nd grade							33	1	33	1			34	1					<u> </u>				100
Specialized Education	Programming Languages	2	2nd grade							33	1	33	1			34	1					L				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			34	1			33	1	33	1									L				100
Specialized Education	Inferential Statistics	2	2nd grade			34	1			33	1	33	1									<u> </u>				100
Specialized Education	Linear Regression Model	2	2nd grade			34	1			33	1	33	1													100
Specialized Education	Statistical Test	2	2nd grade			34	1			33	1	33	1									L				100
Specialized Education	Generalized Linear Model	2	2nd grade											100	1							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	Differential Equations	2	2nd grade					100	1																	100
Specialized Education	Fourier Analysis	2	2nd grade					100	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	Computer Architecture	2	2nd grade													100	1									100
	Operating Systems	2	2nd grade													100	1									100
	Databases	2	2nd grade					100	1							100	Ė					\vdash				100
Specialized Education	Software Engineering	2	2nd grade																			100	1			100
Specialized Education	Information Theory	2						100	1													130				100
Specialized Education	Practical English I	1	2nd grade 3rd grade					100	'									100	1			\vdash				100
	_																									
Specialized Education	Practical English II	1	3rd grade	Ь														100	1			ь				100

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				Ŀ	С	Ub	Ιb	fg Ub	b			ı	g	Ub G					ca d	f b	g	g			ь в с
Specialized Education	Informatics and data science, Exercise I	1	3rd grade							33	1	33	1			34	1								100
Specialized Education	Informatics and data science, Exercise II	1	3rd grade							33	1	33	1			34	1								100
Specialized Education	Informatics and data science, Exercise III	1	3rd grade			34	1			33	1	33	1												100
Specialized Education	Informatics and data science,	1	3rd grade			34	1			33	1	33	1												100
Specialized Education	Theory of Computing	2	3rd grade					50	1	50	1														100
Specialized Education	Image Processing	2	3rd grade													100	1								100
Specialized Education	Visual Computing	2	3rd grade													100	1								100
Specialized Education	Artificial Intelligence and Machine Learning	2	3rd grade					100	1																100
Specialized Education	Computer Network	2	3rd grade							50	1					50	1								100
Specialized Education	Human Computer Interaction	2	3rd grade													100	1								100
Specialized Education	Parallel and Distributed Processing	2	3rd grade													100	1								100
Specialized Education	Software Management	2	3rd grade																		100	1			100
Specialized Education	Natural Language Processing	2	3rd grade					100	1																100
Specialized Education	Information Society and Security	2	3rd grade																		100	1			100
Specialized Education	Data Mining	2	3rd grade			50	1			50	1														100
Specialized Education	Survey design	2	3rd grade											100	1										100
Specialized Education	Nonparametric analysis	2	3rd grade			50	1			50	1														100
Specialized Education	Big Data	2	3rd grade							50	1								50	1					100
Specialized Education	Behaviormetrics	2	3rd grade			100	1																		100
Specialized Education	Econometrics	2	3rd grade																100	1					100
Specialized Education	Time Series Analysis	2	3rd grade											100	1										100
Specialized Education	Biostatistics	2	3rd grade																100	1					100
Specialized Education	Biomedical Statistics	2	3rd grade																100	1					100
Specialized Education	Stochastic Processes	2	3rd grade																100	1					100
Specialized Education	Financial Engineering	2	3rd grade																100	1					100
Specialized Education	Data Analysis for Medical and Welfare Policies	2	3rd grade											100	1										100
Specialized Education	Society and Data Analysis	2	3rd grade																100	1					100
Specialized Education	Total Quality Management and Data Analysis	2	3rd grade																100	1					100
Specialized Education	Education Policy and Data Analysis	2	3rd grade											100	1										100
Specialized Education	Data Science Seminar I	1	4th grade			33	1							33	1				34	1					100
Specialized Education	Data Science Seminar II	1	4th grade			33	1							33	1				34	1					100
Specialized Education	Informatics Seminar I	1	4th grade					33	1							33	1				34	1			100
Specialized Education	Informatics Seminar II	1	4th grade					33	1							33	1				34	1			100
Specialized Education	Graduation thesis	3	4th grade											50	1								50	1	100

Sheet 4

Curriculum Map of Informatics and Data Science Program



Academic Achievement	;	1st grade		2nd ş	grade	3rd g	grade	4th ş	grade
Evaluation Itemas		Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
evidence by using a wide raknowledge and skills related data science.	_								
(4) I3. Knowledge related thardware and software, an					(3T)Digital Circuit Design(⊚) (3T)Operating Systems(○)	(1T)Informatics and data science, Exercise I (⊕, ⊕) (2T)Informatics and data science, Exercise II (⊕, ⊕)		(1T)Informatics Seminar I (, @) (2T)Informatics Seminar II (, @)	
programming skills require					(4T)Programming Languages(⊚)	(2T)Image Processing(, O)	(3T)Parallel and Distributed Processing (Δ, Ο)	(21)mormatics Seminar II (, @)	
efficiently processing data. (1) C2. Skills for communic	ation	Basia English Usago I (@)	Basic English Usage I (◎)	Communication $\Pi \Lambda(\Omega)$	(4T)Computer Architecture (O)	(1T)Practical English I(©)	(4T)Computer Network(△, ⊚)		Graduation Thesis(◎, 《
reading, and writing in En			Communication I A(©)			(11)Tractical English T(@)	(31)1 factical English II (@)		Graduation Thesis (@,
capabilities required for gi		Communication I B(©)	Communication I B(©)	Communication IIC(O)					
good, clear oral presentation documentation and	on, and	Basic Foreign Languages I (O) Basic Foreign Languages II (O)							
communication skills that		0 0							
(2) D3. Ability to examine s				(2T)Basic and practice in Categorical data analysis (Q)		(2T)Econometrics(Ο, Δ)	(3T)Biomedical Statistics (O,)	(1T)Data Science Seminar I (⊚,)	
needs and issues which are				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		(2T)Biostatistics(O,)	(3T)Society and Data Analysis (Δ, Δ)	(2T)Data Science Seminar II (©,)	
interlinked in a complex m using a top-down view to se							(3T) Total Quality Management and Data Analysis (Δ, Δ) $(4T) \text{Big Data}(\emptyset, \emptyset)$		
problems through quantita							(4T)Stochastic Processes (O, O)		
and logical thinking based data, diverse perspectives, advanced skills in informat processing and analysis.	and						(4T)Financial Engineering(O, O)		
(3) I2. Ability to provide the				Mathematical Programming(O)	(3T)Algorithms and Data Structures(◎)	(2T)Software Management (Δ, Ο)		(1T)Informatics Seminar I (, ⊚)	
appropriate system solution cross-sectional problem in				(2T)Software Engineering(O)	(3T)System Optimization(O) (4T)Numerical Computation(O)	(2T)Information Society and Security(O, O)		(2T)Informatics Seminar I (, ⊚)	
diversified and complicated					(41)Numerical computation(O)				
information society based of many forms of cutting edge									
information technology.									Graduation Thesis(◎, ◎)
(4) E. Creative and logical thinking ability for analyzi		(1T)Introductory Seminar for First-Year Students(⊚)							Graduation Thesis(@, @)
practical issues and challen	nges in								
order to provide rational so that match social needs, as the capability to realize the	well as								
solutions.						Libaral Auta Education			

Ex) Liberal Arts Education Specialized Core Subject Specialized Subjects

Graduation Thesis

Type of course registration in parenthesis is as (Data Science and Informatics)