Specifications for Major Program

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

Program name (Japanese)	
English	Computer 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 nBT/F3 17.104 395.21 Tm0 G(1/Sp3/58e3287.68 468.07 reW* nBT/1

science.

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 skills that contribute to active discussion.

The following are the achievement goals for awarding the specified degree in this programs.

Achievement target A. Skills related to the development of (i)-ormamr4(un)-2(o)11(n)-144(p)T□EMC /Sp

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 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, data analysis, and programming.

In the second academic year, each student selects one of “the computer science program,” “the data science program,” and “the intelligence science program.” All students acquire the knowledge and skills that form the basis of each program, while taking subjects of programming, fundamental statistics, and information engineering.

In the third academic year, each student selects a model course based on own future carrier development, while taking more specialized subjects on the chosen program. In the basic model course, students aim at learning wide range of knowledge from fundamentals to applications by taking specialized subjects in department of information and data science. In the integrated model course, students will acquire the ability to work in a wide range of fields, not only in the information field, with an academic background in information science. Specifically, students are allowed to take subjects offered in other school of the university as compulsory elective subjects. In the practical model course, students reconsider their university studies and learn the knowledge and skills required in the industrial world through experiences of long-term fieldwork in companies. Regardless of the three model course, all students take practical English subjects to acquire the ability to play an active role in an increasingly globalized international society.

The seminars in the fourth academic year are required subjects, in which all students learn how to conduct research, discuss, and make advanced presentations. Students who have chosen the basic model course develop the ability to solve highly specialized problems on their own by setting their own themes and completing their graduation theses using the specialized knowledge, skills, and abilities acquired through each program in the school of informatics and data science. Students who have chosen the integrated model course receive guidance for their graduation thesis from faculty members of the school of informatics and other faculty members in other school, and aim to cultivate diverse abilities to utilize knowledge and skills of informatics and data science in various fields. Students who have chosen the practical model course take long-term fieldworks instead of the graduation thesis, and participate in research and development projects and field surveys in companies for eight months to acquire practical skills that can be used immediately in society after graduation.

To enable students to achieve the targets that are defined for the program, the curriculum is organized 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 year, students mainly take subjects that are fundamental to computer science and information processing (achievement targets A, B, D1, D2, D3) and subjects that are fundamental to information processing (achievement targets A, D1, D2). The basic subjects of computer science consist of programming, automata and language theory, digital circuit design, and algorithms and data structures. The basic subjects of information processing consist of information theory, mathematical analysis, and mathematical programming.

In the third year, students take advanced courses related to computer science (achievement targets A, D1, D2, and D3), including computation theory, computer networks, security, various media information processing technologies, parallel and distributed computing, digital signal processing, software engineering, and artificial intelligence and machine learning. In addition, students take Information Science Exercise I, II, III, and IV (achievement targets A and D3) to develop practical skills in circuit and embedded system design, and to acquire skills related to computer science.

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 computer 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 the student 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.)

○ Meaning

Graduation Thesis is a comprehensive subject in which students utilize the specialized knowledge, skills, and abilities that they have acquired in the Computer 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 specified by the department. This course cultivates the ability to

(2) Evaluation of the program

○ Perspectives for evaluation of the program

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?

○ Evaluation method

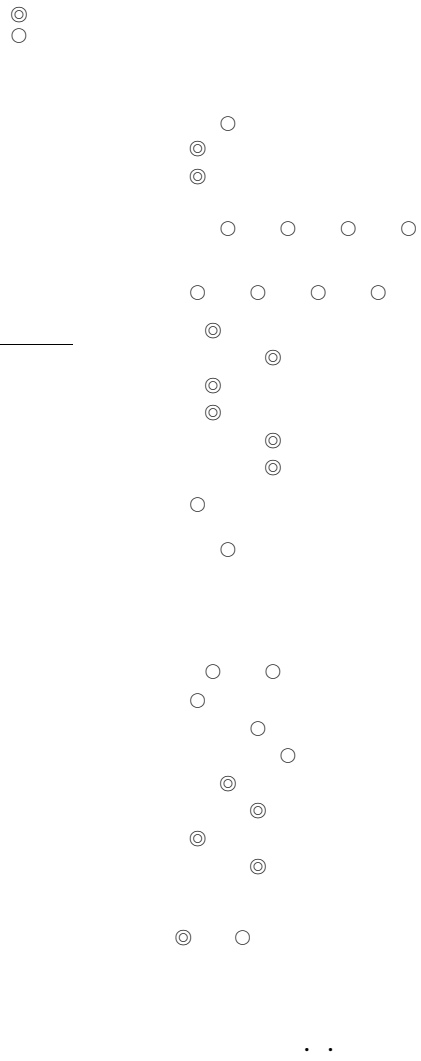
Each subject in the program is evaluated based on student evaluation of the classes and achievement evaluation results.

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.

○ Policy and method for feedback to students

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 with the reason.



◎ Required subject
○ Compulsory elective subject
△ Free elective subject

			Data Science		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Discrete Mathematics I	2					4														
Discrete Mathematics II	2						4													
Programming I	2		◎																	
Programming II	2		◎																	
Programming III	2	◎	◎																	
Programming IV	2		◎																	
Theory of Automata and Languages	2		△						4											
Digital Circuit Design	2		△								4									
Programming Languages	2	○	○									4								
Algorithms and Data Structures	2		○								4									
Fundamentals of Probability Theory	2		◎					4												
Inferential Statistics	2		◎						4											
Linear Regression Model	2		◎							4										
Statistical Test	2	△	◎							4										
Stochastic Modeling	2		○									4								
Numerical Computation	2		○									4								
Mathematical Programming	2	○	○						4											
System Optimization	2										4									
Mathematical Analysis	2	○								4										
Multivariate Analysis	2		◎								4									
Basic and practice in Categorical data analysis	2	△	○							4										
Mechanism how programs run on computer	2											4								
Operating Systems	2										4									
Databases	2											4								
Information Theory	2								4											
Practical English I	1	◎											4							
Practical English II	1														4					
Informatics and Data Science Exercise I	1	◎											3							
Informatics and Data Science Exercise II	1		◎											3						
Informatics and Data Science Exercise III	1														3					
Informatics and Data Science Exercise IV	1		◎													3				
Software Engineering	2													4						
Theory of Computing	2												4							
Image Processing	2		△	○										4						
Visual Computing	2	◎	△	◎											4					
Artificial Intelligence and Machine Learning	2		○	○											4					
Computer Network	2															4				
Human Computer Interaction	2														4					
Parallel and Distributed Processing	2	○																		
Software Management	2	◎																		
Natural Language Processing	2	◎												4						
Information Society and Security	2		△											4						
Digital Signal Processing	2		△	◎									4							
Data Mining	2	△	○										4							
Survey Design	2		○										4							
Nonparametric analysis	2	△	○											4						
Big Data	2	△	◎													4				
Behaviormetrics	2		◎										4							
Econometrics	2	△	○											4						
Time Series Analysis	2	△													4					
Biostatistics	2		○													4				
Stochastic Processes	2	△	○	△												4				
Financial Engineering	2		◎	△												4				
Computer Science Seminar I	1																4			
Computer Science Seminar II	1																	4		
Data Science Seminar I	1		◎														4			
Data Science Seminar II	1		◎															4		
Intelligence Science Seminar I	1																4			
Intelligence Science Seminar II	1																	4		
Graduation Thesis	3		◎																	
Information Processing and Industry	2								4											
Data Science and Management	2										4									
Frontier of Informatics and Data Science	2												4							
Research Project	2													4						
Long-term Fieldwork I	3																			
Long-term Fieldwork II	3																			

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	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	Basic English Usage Ⅱ	1	1st grade											100	1					100
Liberal Arts Education	Communication ⅠA	1	1st grade											100	1					100
Liberal Arts Education	Communication ⅠB	1	1st grade											100	1					100
Liberal Arts Education	Communication ⅡA	1	1st grade											100	1					100
Liberal Arts Education	Communication ⅡB	1	1st grade											100	1					100
Liberal Arts Education	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	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 Subject	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	Seminar in Basic Mathematics Ⅱ	1	1st grade					50	1	50	1									100
Liberal Arts Education	Calculus Ⅰ	2	1st grade					50	1	50	1									100
Liberal Arts Education	CalculusⅠⅡ	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									100
Specialized Education	Programming Ⅰ	2	1st grade					50	1	50	1									100
Specialized Education	Programming Ⅱ	2	1st grade					50	1	50	1									100
Specialized Education	Programming Ⅲ	2	2nd grade					50	1	50	1									100
Specialized Education	Programming Ⅳ	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					50	1	50	1									100
Specialized Education	Linear Regression Model	2	2nd grade					50	1	50	1									100
Specialized Education	Statistical Test	2	2nd grade					50	1	50	1									100
Specialized Education	Stochastic Modeling	2	2nd grade					50	1	50	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	1							100
Specialized Education	Operating Systems	2	2nd grade									100	1							100
Specialized Education	Databases	2	2nd grade			100	1													100
Specialized Education	Software Engineering	2	2nd grade													100	1			100
Specialized Education	Information Theory	2	2nd grade			100	1													100
Specialized Education	Practical English Ⅰ	1	3rd grade											100	1					100
Specialized Education	Practical English Ⅱ	1	3rd grade											100	1					100

				Evaluation items																
				Knowledge and Understanding				Abilities and Skills						Comprehensive Abilities						alues of s in the
				(1) C1		(2) D1		(1) A		(2) B		(3) D3		(1) C2		(2) D2		(3) E		
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					33	1	33	1	34	1							100
Specialized Education	Informatics and data science, Exercise Ⅳ	1	3rd grade					33	1	33	1	34	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	Digital Signal Processing	2	3rd grade									100	1							100
Specialized Education	Data Mining	2	3rd grade					100	1											100
Specialized Education	Survey design	2	3rd grade					100	1											100
Specialized Education	Nonparametric analysis	2	3rd grade					100	1											100
Specialized Education	Big Data	2	3rd grade					100	1											100
Specialized Education	Behaviormetrics	2	3rd grade					100	1											100
Specialized Education	Ec 0 0 EMC P MCID 13 BDC 38 3831 51552 313 re nB o25 ET EMC P 0 0 0-3p 30103 5038 Tm0 g0 G00 cE 3 re0 cE 3 re0 cE 3 re0 cE 3 re0 cE 3 re0 cE 3 re0 cE 21e5																			

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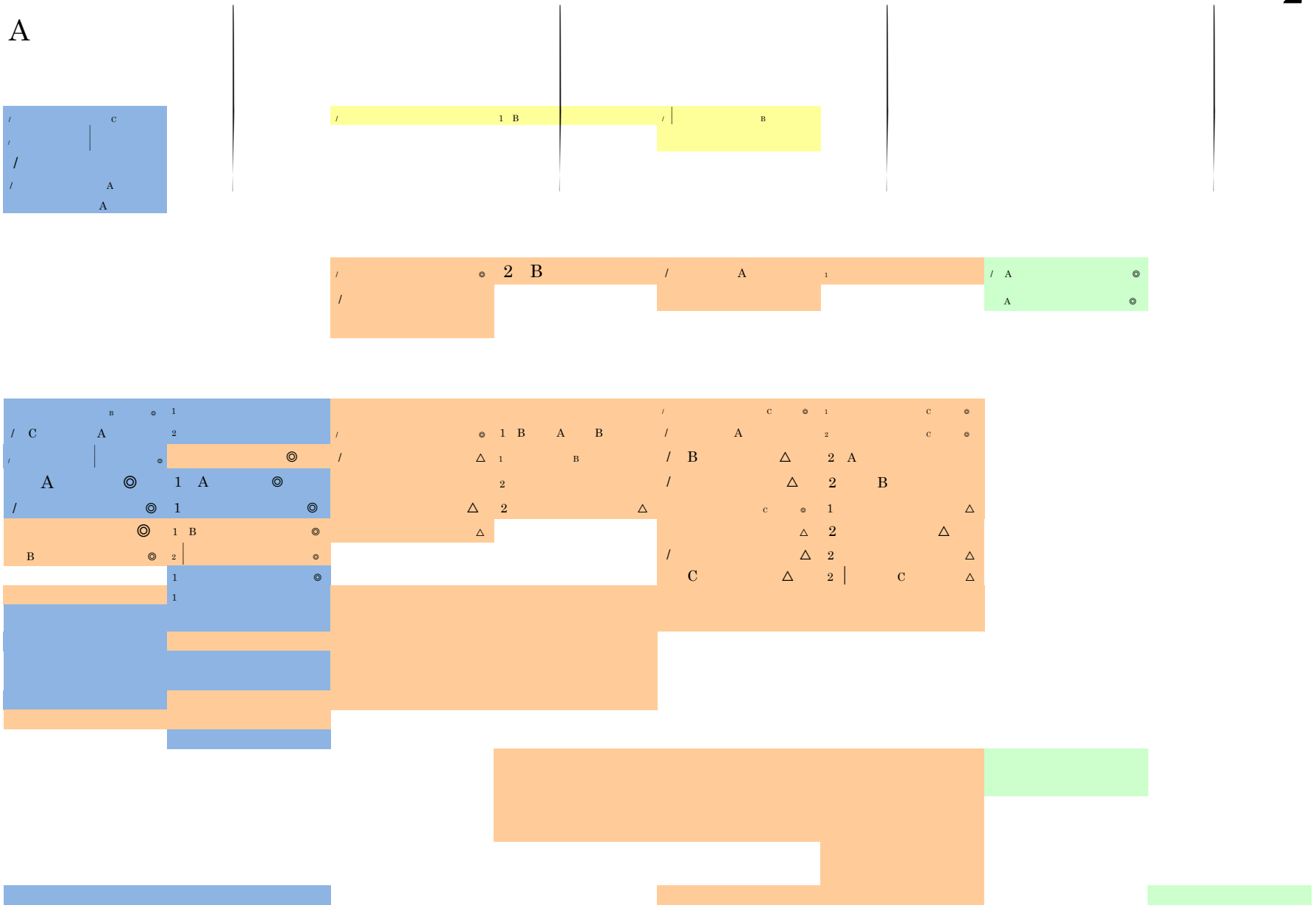

	C	/						1			2						
A	C ,	A A /		A A													
	B ,				/		1 B				/ A ◎ A ◎						
	,						1 2 A	C									
	1 C, A ,	/								◎				◎	◎		
								C	C								