

Mathematics and Computer Science

Introduction

The contribution of interdisciplinary study is becoming increasingly integrated in our society. It's due to collect more data easier about ourselves and our environment in today's world. The interdisciplinary study concerned with the finding of insight from large volumes of unstructured data is called as Data Science. The combination of Mathematics and Computer Science into one study program is intended to maximize the capabilities of the students to get insight in data produced by current technology. This study program has high practical relevance, as the insight from abundant data is an important economic activity. For example, data science techniques can be used for maintaining an information model of the dynamic environment, based on things like real-time sensor data. The program can be completed within 4 - 4.5 years. Furthermore, to provide work experience for students, there are industrial internships, interesting research or entrepreneurship programs for 1 semester.

Vision

A world class department in Computational Mathematics based on ICT.

Mission

The mission of Computer Science and Mathematics Program is to contribute to the global community through the provision of world-class education by:

1. Educating students with fundamental knowledge & skills to apply Computational Mathematics using ICT in developing innovative algorithm and software for a career as an applied mathematician or system analyst;
2. Providing solid learning experience through creating the most creative and value-added talents of leaders for global community as well as conducting professional services to improve the quality of life;
3. Providing high impact research that positively contributing to the quality of life of Indonesians and the international community.

Program Objective

The objectives of the program are:

1. To provide students with a solid knowledge ranging from Fundamental Mathematics and Computer Science to Computational Mathematics and Computing Technology;
2. To provide students with knowledge and abilities in conducting mathematical analysis and modeling to solve problem in related fields to be successful applied mathematics career;
3. To prepare students with necessary techniques & skills in developing innovative algorithm and software to be excellence system analyst.

Student Outcomes

After completing the study, graduates are:

1. Able to create software application design by applying the principles of database system design to solve structured and semi-structured data;
2. Able to design software application solution based on problem analysis which can be solved with structured approach in informatics area;
3. Able to assess technology trend in informatics area to deliver an alternative solution of software development;

4. Able to explore, logical reasoning, generalization abstraction, and formal proof in formulating and model problems with specific variables and assumptions through mathematical approach with or without mathematical software;
5. Able to construct, modify, analyze mathematical models of a system/problems, assess accuracy of the models and make conclusions;
6. Able to analyze various alternative mathematical models that are available and present the conclusions of analysis independently or in groups for making decision;
7. Able to create software by implementing mathematical models.

Prospective Career of the Graduates

The graduates of the double study program Mathematics and Computer Science can follow careers in:

1. Specialist in specific kinds of data, such as natural language text, image data, geographic data, sensor data, networked data
2. Designer of smart devices or smart services
3. Designer of data science algorithms
4. Multi-disciplinary researcher or educator
5. Data Scientist or business analyst

Curriculum

With reference to the Vision and Mission of Binus University, the role of Mathematics and Computer Science in the future and its current standing in Indonesia, the study program will contain the following elements:

1. Solid education to increase mathematical reasoning capability and ability to solve problems in other fields.
2. The academic atmosphere that will facilitate student learning in order that student will develop skills in communicating their mathematical reasoning and skill in software engineering.
3. An environment that fosters active learner independence and encourages students to be able to succeed in their professional career and in fields related to Data Science.

Furthermore, besides this department provides the means and expertise in Data Science to prepare students for a career as a Data Scientist who is able to create mathematical models to solve problems in many related fields, it also provides capability in developing Computer Science or Applied Mathematics both in Indonesia and among the nations of the world in order to pursue higher degree of education.

Course Structure

Sem	Code	Course Name	SCU	Total	
1	CHAR6013	Character Building: <i>Pancasila</i>	2	20	
	COMP6047	Algorithm and Programming	4/2		
	MATH6038	Calculus I*	4		
	MATH6025	Discrete Mathematics*	4		
	STAT6152	Introduction to Data Science**	2		
	English University Courses I				
	ENGL6128	English in Focus	2		
	ENGL6130	English for Business Presentation	2		
2	CHAR6014	Character Building: <i>Kewarganegaraan</i>	2	20	

Sem	Code	Course Name	SCU	Total	
	COMP6048	Data Structures	4/2		
	MATH6016	Calculus II*	4		
	MATH6030	Linear Algebra*&**	2		
	STAT6175	Statistical Methods for Data Science*	2		
	LANG6027	Indonesian	1		
	English University Courses II				
	ENGL6129	English Savvy	2		
ENGL6131	English for Written Business Communication	2			
3	ENTR6509001	Entrepreneurship: Ideation	2	24	
	COMP6056016	Program Design Methods	4		
	COMP6708016	Object Oriented Programming	2/2		
	MATH6019016	Calculus III*	4		
	MATH6144016	Advanced Linear Algebra*	2		
	MATH6008016	Mathematical Statistics I	4		
	MATH6167016	Numerical Methods*&**	2		
	STAT6157016	Data Mining and Visualization*	2		
4	COMP6049016	Algorithm Design and Analysis	4	24	
	ISYS6169016	Database Systems	4/2		
	MATH6146016	Complex Variable Function*&**	2		
	MATH6147016	Ordinary Differential Equations*	2/1		
	MATH6148016	Mathematical Statistics II	2		
	COMP6639016	Artificial Intelligence***	5		
	MATH6149016	Machine Learning*&**	2		
5	CHAR6015016	Character Building: <i>Agama</i>	2	24	
	COMP6176016	Human and Computer Interaction	2/2		
	CPEN6098016	Computer Networks	2/2		
	MATH6018016	Modern Algebra*&**	4		
	MATH6068016	Partial Differential Equations*&**	2		
	MATH6064016	Applied Projective Geometry	2		
	MATH6165016	Deep Learning and Optimization Methods*&**	4		
	STAT6158016	Data Management and Organization*	2		
6	MATH6021016	Real Analysis*	4	22	
	COMP6697016	Operating System	2		
	MATH6151016	Computational Geometry	2		
	COMP6640016	Software Engineering**&***	5		
	MATH6178016	Text Mining	2		
	COMP6051016	Web Programming	2/1		
	MATH6069016	Applied Mathematics Modeling*	2		
	STAT6159016	Big Data Infrastructure and Technology*	2		
7	ENTR6511001	Entrepreneurship: Market Validation	2	22	
	COMP6062016	Compilation Techniques	4		
	RSCH6483016	Research Methodology in Data Science*	2		
	MATH6168016	Computer Vision	2/2		

Sem	Code	Course Name	SCU	Total
	MATH6169016	Speech and Audio Processing	2/2	
	MATH6166016	Data Security**	2	
	Free Electives		4	
8	Enrichment Program		20	20
9	MATH6179016	Pre-Thesis	2	6
	MATH6180016	Thesis	4	
	MATH6091016	Thesis	6	
TOTAL CREDITS 182 Credits				

*) This course is delivered in English

***) Global Learning System Course

****) Entrepreneurship Embedded

-) For Free Electives, students are required to choose from the list of Free Electives in Appendix.

English University Courses:

-) For 1st Semester: English University Courses I, students with Binus University English Proficiency Test score less than 500 will take English in Focus, and student with test score greater than or equal to 500 will take English for Business Presentation.

-) For 2nd Semester: English University Courses II, students with Binus University English Proficiency Test score less than 500 will take English Savvy, and students with test score greater than or equal to 500 will take English for Written Business Communication.

-) Students should pass English Savvy with a minimum Grade is C.

Pre-thesis (2 SCU) & Thesis (4 SCU) can be taken in the 6th and/or 7th semester by the students who meet the requirements from the program.

Appendix: Free Electives (7th Semester)

No	Course Owner Department	Course Code	Course Name	SCU	Semester
1	Business Creation	ENTR6494005	Managing Growing Business	2	7
2	Business Management	MGMT6362005	Global Supply Chain Services	2	7
3	Business Management	MGMT6365005	Current Issue in Service Business and Technology	2	7
4	Business Management	MGMT6400005	Supply Chain Strategy	2	7
5	Global Business Marketing	MKTG6237005	Global Strategic Marketing: Asia Pacific Perspective	4	7
6	International Business Management	BUSS7009005	Export-Import Cost Management	2	7
7	International Business Management	MGMT6370005	E-Business for International Business	2	7
8	International Business Management	MGMT7169005	Global Supply Chain Management	2	7
9	Management	BUSS6069005	Business Simulation	2	7
10	Management	BUSS6163005	Organization Development Strategy	2	7
11	Management	BUSS6194005	Business Negotiation Strategy	2	7
12	Management	ISYS8175005	E-Business Strategy and Implementation	4	7
13	Management	MGMT6029005	Knowledge Management	2	7
14	Management	MGMT6063005	Strategic Management	2	7
15	Management	MGMT6145005	Compensation and Performance Management	2	7
16	Management	MGMT6297005	Operations Management	4	7

No	Course Owner Department	Course Code	Course Name	SCU	Semester
17	Management	MGMT6341005	Strategic Management	4	7
18	Management	MGMT6412005	Customer Relationship Management	2	7
19	Global Business Management	MKTG6272005	Marketing Research	2/2	7
20	Global Business Management	MKTG6294005	Branding & Omnichannel Retailing	4	7
21	Accounting Bekasi	ACCT6389020	Big Data Analytics in Accounting & Finance	2	7
22	Finance	FINC6189020	Introduction to Financial Market and Fin-Tech	2	7
23	Marketing Communication	COMM6514019	Editing for Creative Program	2/2	7
24	Marketing Communication	COMM6523019	Corporate Event Management	2/2	7
25	Marketing Communication	COMM6538019	Media Promotion & Marketing in Creative Broadcasting	2	7
26	Marketing Communication	COMM6539019	Media Convergence in Creative Broadcasting	2	7
27	Marketing Communication	COMM6541019	Digital Corporate Communication	2/2	7
28	Marketing Communication	COMM6542019	Event Management for Brand	2/2	7
29	Marketing Communication	COMM6543019	Digital Brand Communicaton	2/2	7
30	Tourism	TRSM6141022	Tourism Destination and Planning Management	4	7
31	Tourism	TRSM6160022	Tourism Transportation	2	7
32	Tourism	TRSM6208022	Tourism Innovation and Product Development	4	7
33	Tourism	TRSM6196022	Tourism Community Empowerment	2	7
34	Architecture	ARCH6047014	Behavior in Architecture	2	7
35	Architecture	ARCH6061014	Sustainable Architecture	2	7
36	Civil Engineering	CIVL6007013	Harbour Engineering	2	7
37	Civil Engineering	CIVL6009013	Urban Drainage	2	7
38	Civil Engineering	CIVL6015013	Geosynthetic Application in Civil Engineering	2	7
39	Civil Engineering	CIVL6025013	Hydrology	2	7
40	Civil Engineering	CIVL6035013	Airport Engineering	2	7
41	Civil Engineering	CIVL6037013	Railway Engineering	2	7
42	Civil Engineering	CIVL6080013	Construction Methods & Heavy Equipment	2	7
43	Civil Engineering	CIVL8038013	Soil Improvement Method	2	7
44	Civil Engineering	CIVL8056013	Bridge Engineering	2	7
45	Civil Engineering	COMP6046013	Computer Applications in Construction Management	2	7
46	Computer Engineering	CPEN6098010	Computer Networks	2/2	7
47	Computer Engineering	CPEN6126010	Cross Platform Application Development	4	7
48	Computer Engineering	CPEN6225010	Telco Network & Switching System	2	7
49	Computer Engineering	CPEN6232010	Cloud Technology Practice	2	7
50	Food Tech	FOOD6062015	Food Quality Assurance System	2/1	7
51	Food Tech	FOOD6063015	Food Safety & Sanitation	2/1	7

No	Course Owner Department	Course Code	Course Name	SCU	Semester
52	Industrial Engineering	ISYE6067011	Global Supply Chain	2	7
53	Industrial Engineering	ISYE6115011	Transportation Modeling	2	7
54	Industrial Engineering	ISYE6130011	Project Management	2	7
55	Animation	DSGN6689007	Concept Art & Production Design	2	7
56	Animation	DSGN6690007	Animation Storytelling	2	7
57	Creative Advertising	DSGN6661007	Photography	4	7
58	Creative Advertising	DSGN6732007	Photography	4	7
59	Film	FILM6059009	Global Cinema	4	7
60	Business Information Technology	ISYS6579003	Knowledge-Based AI: Cognitive Systems	4	7
61	Information Systems	ISYS6196003	Business Analytics	2	7
62	Information Systems	ISYS6202003	Social Informatics	4	7
63	Information Systems	ISYS6289003	Collaborative Computing	4	7
64	Information Systems	ISYS8066003	Business Process Management	4	7
65	Information Systems Accounting & Audit	ISYS6608003	IT Service & Risk Management	2	7
66	Information Systems Accounting & Audit	ISYS6050003	Information System Audit Fundamental	4	7
67	Cyber Security	COMP6646001	Computer Forensic	2	7
68	International Relations	INTR6151029	Regional Integration in Europe	2	7
69	International Relations	INTR6152029	Regional Integration in America	2	7
70	International Relations	INTR6153029	Regional Integration in East Asia	2	7
71	International Relations	INTR6154029	Regional Integration in Africa and Middle East	2	7
72	International Relations	INTR6161029	Political Economy of Global Media	2	7
73	International Relations	INTR6162029	Multiculturalism and Digital Society	2	7
74	International Relations	INTR6167029	International Political Economy of Multinational Corporations	2	7
75	International Relations	INTR6169029	International Migration: Governance and Rights	2	7
76	International Relations	INTR8049029	Global Economic Architecture	2	7
77	Japanese Literature	JAPN6116025	Japanese Corporate Culture and Management (Nihon No Kigyou Bunka to Manejimento)	2	7
78	Japanese Literature	JAPN6145025	Japanese Grammar I (Bunpou I)	4	7
79	Japanese Literature	JAPN6148025	Japanese Letter I (Kanji I)	2	7
80	Japanese Literature	JAPN6149025	Reading Comprehension I (Dokkai I)	2	7
81	Japanese Literature	JAPN6150025	Ideas and Images of Japanese Culture (Nihon Bunka Aidea to Imeeji)	2	7
82	Japanese Literature	JAPN6173025	Contemporary Japanese Society Through Various Perspective (Nihon Shakai e no Kangaekata)	2	7
83	Japanese Literature	JAPN6111025	Introductory Japanese I	4	7
84	Business Law	LAWS6052028	Bankruptcy Law	2	7
85	Business Law	LAWS6056028	Legal Research Methods	2	7
86	Business Law	LAWS6167028	Legal Philosophy & Professional Ethics	2	7
87	Business Law	LAWS6172028	Environmental and Natural Resources Law	2	7

No	Course Owner Department	Course Code	Course Name	SCU	Semester
88	Business Law	LAWS6174028	Contract & Legislative Drafting	2	7
89	Business Law	LAWS6176028	Tax Law	2	7
90	Chinese Literature	CHIN6157026	Chinese Business for Etiquette (Beginner)	4	7
91	Chinese Literature	CHIN6158026	Chinese Business in Daily Communication	4	7
92	Chinese Literature	CHIN6159026	Chinese Character Writing	2	7
93	English Literature	ENGL6158024	Writing for Children and Young Adults	2	7
94	English Literature	ENGL6244024	Social Media Broadcasting	4	7
95	Primary Teacher Education	EDUC6032030	Art & Craft	2	7
96	Primary Teacher Education	EDUC6033030	Physical Education	2	7
97	Primary Teacher Education	EDUC6037030	Teaching English for Young Learners	2	7
98	Primary Teacher Education	EDUC6061030	ICT for Distance Learning	2	7
99	Primary Teacher Education	EDUC8004030	School Based Management	2	7
100	Psychology	PSYC6127027	Indigenous Psychology	4	7

Enrichment Program (8th Semester):

-) Student will take one of enrichment program tracks (off campus). See enrichment appendix for the tracks detail.

Enrichment Track Scheme

Track	Semester 8						
	IN	RS	EN	CD	SA	IS	etc
1	v						
2		v					
3			v				
4				v			
5					v		
6						v	

Note:

IN	: Certified Internship	SA	: Certified Study Abroad
RS	: Certified Research	IS	: Certified Specific Independent Study
EN	: Certified Entrepreneurship	etc	: Study Program Special Purposes
CD	: Certified Community Development		

Description:

Student will take one of enrichment program tracks

Certified Internship Track

Code	Course Name	SCU	Total
MATH6073016	Internship	8	20
MATH6181016	Mathematical Modeling Solution and Applied Programming in Industry	8	
MATH6076016	EES in Mathematics Industry	4	

Certified Entrepreneurship Track

Code	Course Name	SCU	Total
ENTR6643016	Product Launching in Mathematics	8	20
ENTR6644016	Business Development in Mathematics	8	
ENPR6194016	EES in Mathematics	4	

Certified Research Track

Code	Course Name	SCU	Total
RSCH6224016	Research Experience	8	20
RSCH6530016	Scientific Writing in Mathematics	8	
RSCH6155016	Global EES in Mathematics Research	4	

Certified Community Development Track

Code	Course Name	SCU	Total
CMDV6124016	Community Outreach Project Implementation	8	20
CMDV6312016	Community Outreach in Mathematics Project Design	8	
CMDV6073016	Employability and Entrepreneurial Skills in Mathematics	4	

Certified Study Abroad Track

Code	Course Name	SCU	Total
Elective courses list for study abroad*			
GLOB6005016	Elective Course for Study Abroad 1	4	20
GLOB6006016	Elective Course for Study Abroad 2	4	
GLOB6007016	Elective Course for Study Abroad 3	4	
GLOB6008016	Elective Course for Study Abroad 4	4	
GLOB6009016	Elective Course for Study Abroad 5	2	
GLOB6010016	Elective Course for Study Abroad 6	2	
GLOB6011016	Elective Course for Study Abroad 7	2	
GLOB6012016	Elective Course for Study Abroad 8	2	
GLOB6013016	Elective Course for Study Abroad 9	2	
GLOB6014016	Elective Course for Study Abroad 10	2	
GLOB6015016	Elective Course for Study Abroad 11	2	
GLOB6016016	Elective Course for Study Abroad 12	2	
GLOB6251016	Elective Course for Study Abroad 29	4	

*) Transferred courses will be transferred based on credit transfer policies on study program with total of 20 credits.

Certified Specific Independent Study

Code	Course Name	SCU	Total
Elective courses list for certified specific independent study*			
MICR6033016	Course Certification I	3	20
MICR6034016	Technical Skill Enrichment I	4	
MICR6035016	Industrial Project I	9	

Code	Course Name	SCU	Total
MICR6036016	Soft Skill Enrichment I	4	
MICR6001016	Elective Course for Specific Independent Study 1	8	
MICR6002016	Elective Course for Specific Independent Study 2	8	
MICR6003016	Elective Course for Specific Independent Study 3	6	
MICR6004016	Elective Course for Specific Independent Study 4	6	
MICR6005016	Elective Course for Specific Independent Study 5	6	
MICR6006016	Elective Course for Specific Independent Study 6	5	
MICR6007016	Elective Course for Specific Independent Study 7	5	
MICR6008016	Elective Course for Specific Independent Study 8	5	
MICR6009016	Elective Course for Specific Independent Study 9	5	
MICR6010016	Elective Course for Specific Independent Study 10	4	
MICR6011016	Elective Course for Specific Independent Study 11	4	
MICR6012016	Elective Course for Specific Independent Study 12	4	
MICR6013016	Elective Course for Specific Independent Study 13	4	
MICR6014016	Elective Course for Specific Independent Study 14	4	
MICR6015016	Elective Course for Specific Independent Study 15	3	
MICR6016016	Elective Course for Specific Independent Study 16	3	
MICR6017016	Elective Course for Specific Independent Study 17	3	
MICR6018016	Elective Course for Specific Independent Study 18	3	
MICR6019016	Elective Course for Specific Independent Study 19	3	
MICR6020016	Elective Course for Specific Independent Study 20	3	
MICR6021016	Elective Course for Specific Independent Study 21	2	
MICR6022016	Elective Course for Specific Independent Study 22	2	
MICR6023016	Elective Course for Specific Independent Study 23	2	
MICR6024016	Elective Course for Specific Independent Study 24	2	
MICR6025016	Elective Course for Specific Independent Study 25	2	
MICR6026016	Elective Course for Specific Independent Study 26	2	
MICR6027016	Elective Course for Specific Independent Study 27	2	
MICR6028016	Elective Course for Specific Independent Study 28	2	
MICR6029016	Elective Course for Specific Independent Study 29	1	
MICR6030016	Elective Course for Specific Independent Study 30	1	
MICR6031016	Elective Course for Specific Independent Study 31	1	
MICR6032016	Elective Course for Specific Independent Study 32	1	

*) For students who take BINUS certified specific independent study courses, they should take the first 4 courses on the list above (20 credits). Meanwhile, electives courses 1 to 32 are transferred courses for students who take certified specific independent study outside BINUS University. Transferred courses will be transferred based on credit transfer policies on study program with total of 20 credits.

Student should pass all of these quality controlled courses as listed below:

No	Course Code	Course Name	Minimal Grade
1.	CHAR6013	Character Building: Pancasila	B
2.	ENTR6511001	Entrepreneurship: Market Validation	C
3.	COMP6047	Algorithm and Programming*	C
4.	STAT6152	Introduction to Data Science	C

No	Course Code	Course Name	Minimal Grade
5.	COMP6048	Data Structures*	C
6.	MATH6019016	Calculus III*	C
7.	STAT6157016	Data Mining and Visualization	C
8.	MATH6167016	Numerical Methods*	C
9.	MATH6149016	Machine Learning	C
10.	COMP6639016	Artificial Intelligence	C
11.	MATH6068016	Partial Differential Equations*	C
12.	MATH6018016	Modern Algebra	C
13.	MATH6165016	Deep Learning and Optimization Methods	C
14.	COMP6640	Software Engineering*	C

*) Tutorial & Multipaper