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 study program by providing excellent educational experiences in Computational Mathematics, Fostering and Empowering the Society in Serving and Building the Nation.

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 to effectively apply their educational experiences in Computational Mathematics to solve real-world problems.
2. Preparing our graduates to develop exemplary soft skills & technical skills required as ICT professionals, leaders and entrepreneurs in global market.
3. Promoting high impact research that contributes to the nation.
4. Fostering BINUSIAN as lifelong learners through self-enrichment.
5. Empowering BINUSIAN to continuously improve society's quality of life.

Program Objective

The objectives of the program are:

1. Graduates will become successful professionals in ICT fields;
2. Graduates will obtain employment in global companies or become entrepreneurs;
3. Graduates will obtain professional certification or continue their study to the postgraduate level;
4. Graduate will have ability to pursue higher degree of education.

Student Outcomes

After completing the study, graduates are:

1. Able to analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions
2. Able to design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of computer science
3. Able to communicate effectively in a variety of professional contexts

4. Able to recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles
5. Able to function effectively as a member or leader of a team engaged in activities appropriate to computer science
6. Able to apply computer science theory and software development fundamentals to produce computing-based solutions
7. 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.
8. Able to develop mathematical models of problems and analyze their performance and draw contextual conclusions
9. Able to conduct data science project flow to solve real business and industry problems
10. Able to develop software by implementing mathematical models.
11. Able to apply interdisciplinary knowledge and skills in developing alternative solutions for problem-solving

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	CHAR6013016	Character Building: Pancasila	2	20
	COMP6047016	Algorithm and Programming** (AOL)	4/2	
	MATH6031016	Calculus	4	
	MATH6025016	Discrete Mathematics *	4	

Sem	Code	Course Name	SCU	Total
	STAT6152016	Introduction to Data Science ** (AOL)	2	
	COMP6798016	Program Design Methods* (AOL)	2	
	Foreign Language Courses		0	
2	CHAR6014016	Character Building: Kewarganegaraan	2	20
	COMP6048016	Data Structures*&** (AOL)	4/2	
	MATH6189016	Advanced Calculus I*	4	
	MATH6030016	Linear Algebra *&**	2	
	STAT6171016	Basic Statistics	2	
	LANG6027016	Indonesian	2	
	ENTR6509001	Entrepreneurship: Ideation	2	
	Foreign Language Courses		0	
3	CHAR6015016	Character Building: Agama	2	24
	MATH6183016	Scientific Computing (AOL)	2/1	
	COMP6708016	Object Oriented Programming	2/2	
	MATH6190016	Advanced Calculus II* (AOL)	4	
	MATH6144016	Advanced Linear Algebra * (AOL)	2	
	MATH6008016	Mathematical Statistics I	4	
	SCIE6063016	Computational Physics (AOL)	2/1	
	STAT6157016	Data Mining and Visualization * (AOL)	2	
	Foreign Language Courses		0	
4	MOBI6073016	Embedded System and Internet of Things	2	24
	CPEN6247016	Computer Networks (AOL)	2/1	
	COMP6799016	Database Technology** (AOL)	2/1	
	MATH6146016	Complex Variable Function*&**	2	
	MATH6186016	Mathematical Statistics II	4	
	COMP6065016	Artificial Intelligence** (AOL)	4	
	MATH6187016	Machine Learning * & ** (AOL)	2/1	
	SCIE6062016	Computational Biology	2/1	
	Foreign Language Courses		0	
5	COMP6737016	Geographical Information System*	2	24
	COMP6800016	Human and Computer Interaction** (AOL)	2/1	
	COMP6049016	Algorithm Design and Analysis* (AOL)	4	
	COMP6051016	Web Programming	2/1	
	MATH6188016	Differential Equations *&** (AOL)	4	
	MATH6064016	Applied Projective Geometry	2	
	MATH6165016	Deep Learning and Optimization Methods * & ** (AOL)	4	
	STAT6158016	Data Management and Organization*	2	
6	MATH6021016	Real Analysis *	4	22
	COMP6697016	Operating System (AOL)	2	
	MATH6151016	Computational Geometry	2	
	COMP6100016	Software Engineering** (AOL)	4	
	MATH6178016	Text Mining	2	
	MATH6018016	Modern Algebra *&** (AOL)	4	
	MATH6069016	Applied Mathematics Modeling*	2	
	STAT6159016	Big Data Infrastructure and Technology*	2	
7	ENTR6511001	Entrepreneurship: Market Validation	2	22

Sem	Code	Course Name	SCU	Total
	COMP6062016	Compilation Techniques	4	
	COMP6696016	Research Methodology in Computer Science* (AOL)	2	
	MATH6168016	Computer Vision	2/2	
	MATH6154016	Speech and Audio Processing	2	
	MATH6166016	Data Security **	2	
	MATH6208016	Computational Number Theory	2	
	Free Electives		4	
8	**Enrichment Program**		20	20
9	MATH6179016	Pre-Thesis	2	6
	MATH6180016	Thesis	4	
	MATH6091016	Thesis	6	
Total Credits 182 SCU				

**) This course is delivered in English*
***) Global Learning System Course*

-) **(AOL)** *- Assurance of Learning Process System*

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

Foreign Language Courses:
Students will take foreign language courses according to BINUS University English proficiency test results. See foreign language courses appendix for the details. Students must pass with a minimum Grade of C.

Pre-thesis (2 SCU) & Thesis (4 SCU) *can be taken in the 7th and/or 8th semester by the students who meet the requirements from the Study Program/Program*

Appendix Foreign Language Courses

Code	Course Name	SCU
ENGL6253016	English for Frontrunners	0
ENGL6254016	English for Independent Users	0
ENGL6255016	English for Professionals	0
JAPN6190016	Basic Japanese Language*	0
CHIN6163016	Basic Chinese Language*	0

*) This course is optional for students

1. Students with Binus University English Proficiency Test score less than 437 are required to take English for Frontrunners and English for Independent Users.
2. Students with Binus University English Proficiency Test score less than 520 are required to take English for Independent Users and English for Professionals.
3. Students with Binus University English Proficiency Test score equal to or greater than 520 are required to take English for Professionals. Additionally, students may choose to take either Basic Japanese Language or Basic Chinese Language.
4. Students are required to pass the foreign language courses before they take enrichment.
5. Students can see the requirements to pass the foreign language courses at BINUSMAYA – Beelingua.

Appendix: Free Electives (7th Semester)

No	Course Owner Department	Course Code	Course Name	SCU	Semester
1	Business Management	MGMT6400005	Supply Chain Strategy	2	7
2	Business Management	MGMT6459005	Retail Management	4	7

No	Course Owner Department	Course Code	Course Name	SCU	Semester
3	Business Management	MGMT6460005	Retail Supply Chain Management	2	7
4	Business Management	MKTG6324005	Retail Marketing Management	2	7
5	Business Management	MGMT6461005	Category Management	2	7
6	Management	MGMT6297005	Operations Management	4	7
7	Management	FINC6001005	Financial Management	4	7
8	Global Business Marketing	MKTG6321005	Marketing Data Analytics	4	7
9	Global Business Marketing	MKTG6322005	Sales and Customer Relationship Management	4	7
10	Global Business Marketing	MKTG6237005	Global Strategic Marketing : Asia Pasific Perspective	4	7
11	Global Business Marketing	MKTG6270005	Retail and Omni Channel	2	7
12	Global Business Marketing	MKTG6272005	Marketing Research	2/2	7
13	Global Business Marketing	MGMT6358005	Managing Business Information	2/2	7
14	International Business Management	MGMT6357005	Multinational Corporation Management	4	7
15	International Business Management	BUSS6223005	Trade in Asia	2	7
16	International Business Management	BUSS6224005	Special Topics in International Business	4	7
17	Civil Engineering	CIVL6080013	Construction Methods & Heavy Equipment	2	7
18	Civil Engineering	COMP6046013	Computer Applications in Construction Management	2	7
19	Civil Engineering	CIVL6030013	Environmental Engineering	2	7
20	Civil Engineering	CIVL6002013	Case Study in Civil Engineering	2	7
21	Computer Engineering	CPEN6098010	Computer Networks	2/2	7
22	Computer Engineering	CPEN6126010	Cross Platform Application Development	4	7
23	Computer Engineering	CPEN6225010	Telco Network & Switching System	2	7
24	Computer Engineering	CPEN6232010	Cloud Technology Practice	2	7
25	Computer Engineering	CPEN6220010	Computer Networks & Information Security	4/1	7
26	Industrial Engineering	ISYE6067011	Global Supply Chain	2	7
27	Industrial Engineering	ISYE6165011	Supply Chain Risk & Negotiation	2	7
28	Industrial Engineering	ISYE6115011	Transportation Modeling	2	7
29	Industrial Engineering	MKTG6128011	Market Research	2	7
30	Industrial Engineering	ISYE6167011	Decision Support System	2	7
31	Industrial Engineering	ISYE6168011	Financial Engineering	2	7
32	Industrial Engineering	ISYE6130011	Project Management	2	7
33	Industrial Engineering	ISYE6169011	Maintenance Management Systems	2	7
34	Industrial Engineering	ISYE6170011	Sustainable Engineering Systems	2	7
35	Industrial Engineering	ISYE6113011	Leadership & Organizational Behavior	2	7
36	Food Technology	FOOD6092015	Molecular Gastronomy	2	7
37	Food Technology	FOOD6074015	Food Processing Technology II	2	7
38	Food Technology	FOOD6076015	Food Fermentation Technology	2	7
39	Food Technology	FOOD6073015	Current Issues in Food	2	7

No	Course Owner Department	Course Code	Course Name	SCU	Semester
			Technology		
40	Food Technology	CPEN6235015	IoT in Food Industry	2	7
41	Food Technology	FOOD6094015	Nutrition & Health	4	7
42	Architecture	ARCH6144014	Digital Construction	4	7
43	Architecture	ARCH6076014	Project Management	2	7
44	Architecture	ARCH6144014	Property Assessment	2	7
45	Architecture	ARCH6146014	Interior Architecture	4	7
46	Architecture	ARCH6128014	Multimedia in Design Presentation	4	7
47	Architecture	ARCH6129014	Urban Housing	4	7
48	Architecture	ARCH6147014	Behavior in Architecture	4	7
49	Architecture	ARCH6131014	Architectural Conservation	4	7
50	Architecture	ARCH6136014	Tropical Architecture	4	7
51	Game Application and Technology	GAME6085001	Object Oriented Game Programming	2	7
52	Marketing Communication	COMM6635019	Integrated Marketing Communication	2	7
53	Marketing Communication	COMM6637019	Brand Activation	2/2	7
54	Marketing Communication	COMM6638019	Social Media Planning & Engagement	2/2	7
55	Accounting	ACCT6116020	Social and Environmental Accounting	2	7
56	Accounting	ACCT6461020	Accounting Syariah	2	7
57	Accounting	ACCT6462020	Audit Psychology	2	7
58	Accounting	ACCT6313020	Public Sector Accounting	2	7
59	Taxation	TAXN6053020	Regional Tax Systems	2	7
60	Finance	FINC6189020	Introduction to Financial Market and Fin-Tech	2	7
61	Finance	FINC6010020	International Finance	2	7
62	Cyber Security	COMP6542001	Computer Security Fundamental	2	7
63	Mobile Application & Technology	MOBI6068001	Web Design	2	7
64	Mobile Application & Technology	MOBI6070001	Embedded System and Internet of Things	3	7
65	Mobile Application & Technology	MOBI6059001	Mobile Programming	2	7
66	Information Systems	ISYS6196003	Business Analytics	2	7
67	Information Systems	ISYS6199003	Data & Text Mining	4	7
68	Information Systems	ISYS6202003	Social Informatics	4	7
69	Information Systems	ISYS6289003	Collaborative Computing	4	7
70	Information Systems	ISYS6402003	Business Analytics	2/2	7
71	Information Systems	ISYS8066003	Business Process Management	4	7
72	Business Information Technology	ISYS6579003	Knowledge-Based AI: Cognitive Systems	4	7
73	Animation	DSGN6689007	Concept Art & Production Design	2	7
74	Animation	DSGN6690007	Animation Storytelling	2	7
75	Creative Advertising	DSGN6661007	Photography	4	7
76	Creative Advertising	DSGN6732007	Photography	4	7
77	Film	FILM6059009	Global Cinema	4	7

No	Course Owner Department	Course Code	Course Name	SCU	Semester
78	Chinese Literature	CHIN6157026	Chinese Business for Etiquette (Beginner)	4	7
79	Chinese Literature	CHIN6158026	Chinese Business in Daily Communication	4	7
80	Chinese Literature	CHIN6159026	Chinese Character Writing	2	7
81	English Literature	SOCS6021024	Social and Digital Media Writing	2	7
82	English Literature	ENGL6169024	English for Professionals	2	7
83	English Literature	ENGL6244024	Social Media Broadcasting	4	7
84	English Literature	EDUC6054024	Classroom Communication and Learning	4	7
85	Business Law	LAWS6017028	Intellectual Property Rights	4	7
86	Business Law	LAWS6110028	Cyber Law	2	7
87	Business Law	LAWS6159028	Legal Aspect in Business	2	7
88	Business Law	LAWS6168028	Banking-Financial Law & Islamic Business Law	4	7
89	Business Law	LAWS6169028	Capital Market, Legal Audit, & Due Deligence	4	7
90	Business Law	LAWS6170028	Investment Law	2	7
91	Business Law	LAWS6171028	Business Competition & Consumer Protection Law	2	7
92	Business Law	LAWS6181028	Industrial Relations & Alternative Dispute Resolution	2	7
93	Business Law	LAWS6052028	Bankruptcy Law	2	7
94	Business Law	LAWS6167028	Legal Philosophy & Professional Ethics	2	7
95	Japanese Literature	JAPN6151025	Reflection of Japanese Experience (Nihon Keiken no Han'ei)	2	7
96	Japanese Literature	JAPN6162025	Japanese Literary Criticism (Nihon Bungaku Hyouron)	2	7
97	Japanese Literature	JAPN6148025	Japanese Letter I (Kanji I)	2	7
98	Japanese Literature	JAPN6149025	Reading Comprehension I (Dokkai I)	2	7
99	Japanese Literature	JAPN6116025	Japanese Corporate Culture and Management (Nihon No Kigyou Bunka to Manejimento)	2	7
100	Japanese Literature	JAPN6150025	Ideas and Images of Japanese Culture (Nihon Bunka Aidea to Imeeji)	2	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*			20
GLOB6005016	Elective Course for Study Abroad 1	4	
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	

Code	Course Name	SCU	Total
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*			
CSIS6001016	Course Certification	3	
CSIS6002016	Technical Skill Enrichment	4	
CSIS6003016	Industrial Project	9	
CSIS6004016	Soft Skill Enrichment	4	
CSIS6005016	Elective Course for Specific Independent Study 1	8	
CSIS6006016	Elective Course for Specific Independent Study 2	8	
CSIS6007016	Elective Course for Specific Independent Study 3	6	
CSIS6008016	Elective Course for Specific Independent Study 4	6	
CSIS6009016	Elective Course for Specific Independent Study 5	6	
CSIS6010016	Elective Course for Specific Independent Study 6	5	
CSIS6011016	Elective Course for Specific Independent Study 7	5	
CSIS6012016	Elective Course for Specific Independent Study 8	5	
CSIS6013016	Elective Course for Specific Independent Study 9	5	
CSIS6014016	Elective Course for Specific Independent Study 10	4	
CSIS6015016	Elective Course for Specific Independent Study 11	4	20
CSIS6016016	Elective Course for Specific Independent Study 12	4	
CSIS6017016	Elective Course for Specific Independent Study 13	4	
CSIS6018016	Elective Course for Specific Independent Study 14	4	
CSIS6019016	Elective Course for Specific Independent Study 15	3	
CSIS6020016	Elective Course for Specific Independent Study 16	3	
CSIS6021016	Elective Course for Specific Independent Study 17	3	
CSIS6022016	Elective Course for Specific Independent Study 18	3	
CSIS6023016	Elective Course for Specific Independent Study 19	3	
CSIS6024016	Elective Course for Specific Independent Study 20	3	
CSIS6025016	Elective Course for Specific Independent Study 21	2	
CSIS6026016	Elective Course for Specific Independent Study 22	2	
CSIS6027016	Elective Course for Specific Independent Study 23	2	
CSIS6028016	Elective Course for Specific Independent Study 24	2	
CSIS6029016	Elective Course for Specific Independent Study 25	2	
CSIS6030016	Elective Course for Specific Independent Study 26	2	

Code	Course Name	SCU	Total
CSIS6031016	Elective Course for Specific Independent Study 27	2	
CSIS6032016	Elective Course for Specific Independent Study 28	2	
CSIS6033016	Elective Course for Specific Independent Study 29	1	
CSIS6034016	Elective Course for Specific Independent Study 30	1	
CSIS6035016	Elective Course for Specific Independent Study 31	1	
CSIS6036016	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.	CHAR6013016	Character Building: Pancasila	B
2.	COMP6047016	Algorithm and Programming*	C
3.	COMP6798016	Program Design Methods*	C
4.	COMP6048016	Data Structures*	C
5.	MATH6183016	Scientific Computing*	C
6.	MATH6190016	Advanced Calculus II*	C
7.	STAT6157016	Data Mining and Visualization	C
8.	MATH6187016	Machine Learning	C
9.	COMP6799016	Database Technology	C
10.	MATH6188016	Differential Equations*	C
11.	COMP6100016	Software Engineering*	C
12.	COMP6697016	Operating System	C
13.	MATH6018016	Modern Algebra	C
14.	ENTR6511001	Entrepreneurship: Market Validation	C

*) Tutorial & Multipaper