Mathematics

Introduction

Mathematics plays a fundamental role in various aspects of science, technology, and society. Its theoretical framework provides essential tools for analyzing patterns, solving complex problems, and making data-driven decisions. In today's rapidly evolving world, mathematics contributes significantly to fields such as artificial intelligence, finance, logistics, data analysis, and scientific modeling.

The Mathematics study program is designed to develop students' analytical thinking, logical reasoning, and problem-solving skills through a rigorous and comprehensive curriculum. Students will explore a wide range of mathematical fields including pure mathematics, applied mathematics, statistics and computational mathematics.

The program is designed to be completed within 4 years. To enhance students' competencies and provide professional exposure, the program also offers opportunities such as industrial internships, research projects, and entrepreneurship experiences for one 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 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 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;
2. Able to develop mathematical models of problems and analyze their performance and draw contextual conclusions;

3. Able to conduct data science project flow to solve real business and industry problems;
4. Able to develop software by implementing mathematical models;
5. Able to apply interdisciplinary knowledge and skills in developing alternative solutions for problem-solving.

Prospective Career of the Graduates

The graduates of the Mathematics study program can follow careers in:

- Mathematical Modeler or Simulation Specialist – creating models to simulate real-world systems in areas like epidemiology, engineering, and environmental science.
- Operations Research Analyst – applying mathematical methods to optimize processes in logistics, manufacturing, and service industries.
- Data Analyst or data scientist – analyzing and interpreting complex data for decision-making in business, healthcare, government, and other sectors.
- Quantitative Analyst – developing mathematical models for risk analysis and financial forecasting, particularly in banking, insurance, and investment sectors.
- Mathematics Educator or Academic Researcher – teaching and conducting research in schools, universities, or research institutions.
- Actuary – analyzing financial risks using mathematics, statistics, and financial theory.
- Graduate Studies – pursuing advanced studies (Master's or PhD) in mathematics, data science, statistics, or other related fields.

Curriculum

With reference to the Vision and Mission of BINUS University, and considering the strategic role of Mathematics in addressing complex problems in science, technology, and society, the Mathematics study program is designed with the following key elements:

1. **Strong foundation in mathematical reasoning and problem-solving**, where students develop the ability to communicate mathematical ideas effectively, both in written and oral forms. It enabling students to analyze and solve real-world problems across various disciplines.
2. **Academic environment that supports Artificial Intelligence**, integrate foundational and advanced mathematical concepts that underpin AI technologies, while fostering research, innovation, and interdisciplinary collaboration.
3. **Learning experience that fosters independent thinking and professional readiness**, preparing students to succeed in careers related to mathematics, statistics, quantitative analysis, and research.

Course Structure

Sem	Code	Course Name	SCU	Total
1	CHAR6013016	Character Building: Pancasila	2	20
	COMP6047016	Algorithm and Programming[2]	4/2	
	MATH6031016	Calculus	4	
	MATH6025016	Discrete Mathematics[1]	4	
	STAT6152016	Introduction to Data Science[2]	2	
	COMP6798016	Program Design Methods[1]	2	
	Foreign Language Courses		0	

Sem	Code	Course Name	SCU	Total
2	CHAR6014016	Character Building: Kewarganegaraan	2	20
	COMP6048016	Data Structures[1&2]	4/2	
	MATH6189016	Advanced Calculus I[1]	4	
	MATH6030016	Linear Algebra[1&2]	2	
	STAT6171016	Basic Statistics	2	
	LANG6027016	Indonesian	2	
	ENTR6509001	Entrepreneurship: Ideation	2	
	Foreign Language Courses			
3	CHAR6015016	Character Building: Agama	2	20
	MATH6183016	Scientific Computing	2/1	
	MATH6190016	Advanced Calculus II[1]	4	
	MATH6144016	Advanced Linear Algebra[1]	2	
	MATH6008016	Mathematical Statistics I	4	
	SCIE6063016	Computational Physics	2/1	
	STAT6157016	Data Mining and Visualization[1]	2	
	Foreign Language Courses			
4	MATH6146016	Complex Variable Function[1&2]	2	20
	MATH6186016	Mathematical Statistics II	4	
	MATH6187016	Machine Learning[1&2]	2/1	
	MATH6021016	Real Analysis1	4	
	COMP6708016	Object Oriented Programming	2/2	
	SCIE6062016	Computational Biology	2/1	
	Foreign Language Courses			
5	ENTR6511001	Entrepreneurship: Market Validation	2	20
	MATH6188016	Differential Equations[1&2]	4	
	COMP6737016	Geographical Information System[1]	2	
	MATH6064016	Applied Projective Geometry	2	
	MATH6165016	Deep Learning and Optimization Methods	4	
	MATH6208016	Computational Number Theory	2	
	MATH6166016	Data Security[2]	2	
	MATH6154016	Speech and Audio Processing	2	
6	MATH6151016	Computational Geometry	2	20
	MATH6069016	Applied Mathematics Modeling[1]	2	
	STAT6159016	Big Data Infrastructure and Technology[1]	2	
	MATH6018016	Modern Algebra[1&2]	4	
	COMP6696016	Research Methodology in Computer Science[1]	2	
	MATH6168016	Computer Vision	2/2	
	Free Electives		4	
7	**Enrichment Program**			20
8	MATH6091016	Thesis	6	6
				Total Credits 146 SCU

[1]) This course is delivered in English
[2]) Global Learning System Course

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 Beelingua Placement Test results. See foreign language courses appendix for the details. Students must pass with a minimum Grade of C.

Appendix Foreign Language Courses

Foreign Language Courses		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 Beelingua Placement Test score less than 60 are required to take English for Frontrunners and English for Independent Users.*
2. *Students with Beelingua Placement Test score between 60 and 99 are required to take English for Independent Users and English for Professionals.*
3. *Students with Beelingua Placement Test score greater than 99 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 (6th Semester)

No	Course Owner Department	Course Code	Course Name	SCU	Semester
1	Taxation	TAXN6053020	Regional Tax Systems	2	6
2	Psychology	PSYC6145027	Urban Psychology	4	6
3	Psychology	PSYC6191027	E-Learning Psychology	4	6
4	Psychology	PSYC6138027	Lifespan Development	4	6
5	New Media	DSGN6743007	Digital Graphic Reproduction	4	6
6	Marketing Communication	COMM6624019	Digital Creative Content	2/2	6
7	Marketing Communication	COMM6620019	Online Publishing	2/2	6
8	Marketing Communication	COMM6533019	Creative Program Design	2/2	6
9	Marketing Communication	COMM6630019	Crisis Communication	2	6
10	Marketing Communication	COMM6631019	Public Affair	2	6
11	Marketing Communication	COMM6633019	Corporate Sustainability	4	6
12	Marketing Communication	COMM6632019	Writing for Corporate Communication	2/2	6
13	Marketing Communication	COMM6541019	Digital Corporate Communication	2/2	6

No	Course Owner Department	Course Code	Course Name	SCU	Semester
14	Marketing Communication	COMM6634019	Environmental Issues and Brand Activism	4	6
15	Marketing Communication	COMM6635019	Integrated Marketing Communication	2	6
16	Marketing Communication	COMM6637019	Brand Activation	2/2	6
17	Marketing Communication	COMM6638019	Social Media Planning & Engagement	2/2	6
18	International Relations	INTR6153029	Regional Integration in East Asia	2	6
19	International Relations	INTR6179029	Introduction to Security Studies	2	6
20	International Relations	INTR6180029	Introduction to International Media	2	6
21	International Business Management	MGMT6357005	Multinational Corporation Management	4	6
22	International Business Management	BUSS6223005	Trade in Asia	2	6
23	International Business Management	BUSS6224005	Special Topics in International Business	4	6
24	Industrial Engineering	ISYE6067011	Global Supply Chain	2	6
25	Industrial Engineering	ISYE6165011	Supply Chain Risk & Negotiation	2	6
26	Industrial Engineering	ISYE6115011	Transportation Modeling	2	6
27	Industrial Engineering	ISYE6167011	Decision Support System	2	6
28	Industrial Engineering	ISYE6168011	Financial Engineering	2	6
29	Industrial Engineering	ISYE6130011	Project Management	2	6
30	Industrial Engineering	ISYE6169011	Maintenance Management Systems	2	6
31	Industrial Engineering	ISYE6170011	Sustainable Engineering Systems	2	6
32	Hotel Management	MGMT6304021	Organization Behavior in Hospitality	2	6
33	Hotel Management	HTMN6145021	Revenue Management in Hospitality	2	6
34	Hotel Management	HTMN6018021	Consumer Behavior in Hospitality	2	6
35	Hotel Management	HTMN6148021	Research Methodology in Hospitality	4	6
36	Global Business Marketing	MKTG6321005	Marketing Data Analytics	4	6
37	Global Business Marketing	MKTG6322005	Sales and Customer Relationship Management	4	6
38	Global Business Marketing	MKTG6237005	Global Strategic Marketing : Asia Pasific Perspective	4	6
39	Global Business Marketing	MKTG6270005	Retail and Omni Channel	2	6
40	Global Business Marketing	MKTG6631005	Marketing Research	3/1	6
41	Global Business Marketing	MGMT6358005	Managing Business Information	2/2	6
42	Game Application and Technology	GAME6085001	Object Oriented Game Programming	2	6
43	Film	FILM6059009	Global Cinema	4	6
44	English Literature	SOCS6021024	Social and Digital Media Writing	2	6

No	Course Owner Department	Course Code	Course Name	SCU	Semester
45	English Literature	ENGL6169024	English for Professionals	2	6
46	English Literature	ENGL6244024	Social Media Broadcasting	4	6
47	English Literature	EDUC6054024	Classroom Communication and Learning	4	6
48	Cyber Security	COMP6542001	Computer Security Fundamental	2	6
49	Creative Advertising	DSGN6661007	Photography	4	6
50	Computer Science	COSC6108001	Mobile Programming	2	6
51	Computer Science	COMP6586001	Embedded Systems	2	6
52	Computer Engineering	CPEN6126010	Cross Platform Application Development	4	6
53	Computer Engineering	CPEN6232010	Cloud Technology Practice	2	6
54	Computer Engineering	CPEN6236010	PLC Programming for Industrial Automation	2	6
55	Civil Engineering	CIVL6080013	Construction Methods & Heavy Equipment	2	6
56	Civil Engineering	COMP6046013	Computer Applications in Construction Management	2	6
57	Civil Engineering	CIVL6030013	Environmental Engineering	2	6
58	Civil Engineering	CIVL6002013	Case Study in Civil Engineering	2	6
59	Business Management	MGMT6400005	Supply Chain Strategy	2	6
60	Business Management	MGMT6459005	Retail Management	4	6
61	Business Management	MGMT6460005	Retail Supply Chain Management	2	6
62	Business Management	MKTG6324005	Retail Marketing Management	2	6
63	Business Management	MGMT6461005	Category Management	2	6
64	Business Law	LAWS6017028	Intellectual Property Rights	4	6
65	Business Law	LAWS6110028	Cyber Law	2	6
66	Business Law	LAWS6159028	Legal Aspect in Business	2	6
67	Business Law	LAWS6168028	Banking-Financial Law & Islamic Business Law	4	6
68	Business Law	LAWS6169028	Capital Market, Legal Audit, & Due Deligence	4	6
69	Business Law	LAWS6170028	Investment Law	2	6
70	Business Law	LAWS6171028	Business Competition & Consumer Protection Law	2	6
71	Business Law	LAWS6181028	Industrial Relations & Alternative Dispute Resolution	2	6
72	Business Law	LAWS6052028	Bankruptcy Law	2	6
73	Business Law	LAWS6167028	Legal Philosophy & Professional Ethics	2	6
74	Business Law	LAWS6174028	Contract & Legislative Drafting	2	6
75	Business Law	LAWS6176028	Tax Law	2	6
76	Japanese Literature	JAPN6151025	Reflection of Japanese Experience (Nihon Keiken no Han'ei)	2	6
77	Japanese Literature	JAPN6162025	Japanese Literary Criticism (Nihon Bungaku Hyouron)	2	6
78	Japanese Literature	JAPN6111025	Introductory Japanese I	4	6
79	Japanese Literature	JAPN6150025	Ideas and Images of Japanese Culture (Nihon Bunka Aidea to Imeeji)	2	6

No	Course Owner Department	Course Code	Course Name	SCU	Semester
80	Japanese Literature	JAPN6173025	Contemporary Japanese Society Through Various Perspective (Nihon Shakai e no Kangaekata)	2	6
81	Japanese Literature	JAPN6116025	Japanese Corporate Culture and Management (Nihon No Kigyou Bunka to Manejimento)	2	6
82	Business Information Technology	ISYS6579003	Knowledge-Based AI: Cognitive Systems	4	6
83	Business Creation	ENPR6142005	Digital Business Transformation	4	6
84	Business Creation	ENPR6106005	Product Design & Branding	2	6
85	Business Creation	ENPR6107005	Business Communication & Strategy	4	6
86	Architecture	ARCH6145014	Property Assessment	2	6
87	Architecture	ARCH6146014	Interior Architecture	4	6
88	Architecture	ARCH6128014	Multimedia in Design Presentation	4	6
89	Architecture	ARCH6129014	Urban Housing	4	6
90	Architecture	ARCH6147014	Behavior in Architecture	4	6
91	Animation	DSGN6689007	Concept Art & Production Design	2	6
92	Animation	DSGN6690007	Animation Storytelling	2	6
93	Accounting	ACCT6116020	Social and Environmental Accounting	2	6
94	Accounting	ACCT6461020	Accounting Syariah	2	6
95	Accounting	ACCT6462020	Audit Psychology	2	6
96	Accounting	ACCT6313020	Public Sector Accounting	2	6
97	Biotechnology	BTEC6018056	Bioinformatics II	2/2	6
98	Chinese Literature	CHIN6157026	Chinese Business for Etiquette (Beginner)	4	6
99	Chinese Literature	CHIN6158026	Chinese Business in Daily Communication	4	6
100	Chinese Literature	CHIN6159026	Chinese Character Writing	2	6

Enrichment Program (7th Semester):

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

Enrichment Track Scheme

Track	Semester 7						
	IN	RS	EN	CD	SA	IS	etc
1	v						
2		v					
3			v				
4				v			
5					v		
6						v	

Note:

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

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	
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	
MICR6034016	Technical Skill Enrichment I	4	
MICR6035016	Industrial Project I	9	
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	20
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.	CHAR6013016	Character Building: Pancasila	B
2.	COMP6798016	Program Design Methods*	C
3.	COMP6047016	Algorithm and Programming*	C
4.	COMP6048016	Data Structures*	C
5.	STAT6157016	Data Mining and Visualization	C
6.	MATH6183016	Scientific Computing*	C
7.	MATH6190016	Advanced Calculus II*	C
8.	MATH6187016	Machine Learning	C
9.	MATH6188016	Differential Equations*	C
10.	MATH6018016	Modern Algebra	C
11.	ENTR6511001	Entrepreneurship: Market Validation	C

*) Tutorial