

Data Science

Introduction

As the world has entered the era of big data, the need for processing big data is required. The use of Big Data will become the basis of competition and growth for industry and business. Data Science is the secret recipe here. Data Science is a blend of various technology tools, statistics, and machine learning with the goal of discovering hidden patterns from the raw data. It can enhance productivity and create significant value for the world economy by increasing the quality of products and services and reducing waste. The students will solve complex data problems with their strong Data Science expertise. They will use the latest technologies in finding solutions and reaching conclusions. The program can be completed within 3.5-4 years. Furthermore, to provide one-year work experience for students, there are industrial internships, interesting research, or entrepreneurship programs.

Vision

A world class study program by providing excellent educational experiences in Computer Science, which focuses on developing creative technology solutions, fostering and empowering the society in building and serving the nation.

Mission

The mission of Data Science 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 developing creative solutions in computer science, to solve real-world problems.
2. Preparing graduates to develop exemplary soft skills & technical skills required as computer science professionals, leaders, and entrepreneurs in global market.
3. Promoting high impact computer science research that contributes to the nation.
4. Fostering BINUSIAN as computer science lifelong learners through self-enrichment.
5. Empowering BINUSIAN to continuously improve society's quality of life through knowledge in computer science.

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.

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 conduct data science project flow to solve real business and industry problems;
8. Able to use big data technology to get business insight in digital era.

Prospective Career of the Graduates

The graduates of Data Science program can follow careers in:

- | | | |
|-------------------|--------------------|-------------------------------|
| 1. Data Architect | 3. Data Analyst | 5. Database Administrator |
| 2. Data Engineer | 4. Data Visualizer | 6. Machine Learning Scientist |

Curriculum

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

1. Solid knowledge of Big Data technology as a framework and solutions to store data.
2. Robust education to increase logical reasoning capability for mastering Data Analytics and ability to solve problems in other fields.
3. The academic atmosphere that will facilitate student learning in order that student will develop skills in communicating their solutions based on Data.
4. 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, this department provides the means and expertise in Data Science to prepare students for a career as a Data Scientist who is able to use the latest technologies in finding solutions and reaching conclusions based on Data. It also provides capability in developing Data Science expertise 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	CHAR6013001	Character Building: Pancasila	2	20
	MATH6025001	Discrete Mathematics	4	
	MATH6031001	Calculus	4	
	COMP6047001	Algorithm and Programming**	4/2	
	DTSC6001001	Introduction to Data Science**	2	
	COMP6798001	Program Design Methods*	2	
2	CHAR6014001	Character Building: Kewarganegaraan	2	20
	MATH6030001	Linear Algebra	2	
	COMP6048001	Data Structures*&**	4/2	
	STAT6171001	Basic Statistics	2	
	ENTR6509001	Entrepreneurship: Ideation	2	
	DTSC6005001	Data Mining and Visualization*&***	2/1	
	MATH6183001	Scientific Computing	2/1	

Sem	Code	Course Name	SCU	Total	
3	CHAR6015001	Character Building: Agama	2	21	
	LANG6027001	Indonesian	2		
	COMP6065001	Artificial Intelligence**	4		
	DTSC6006001	Machine Learning*&***	2/1		
	SCIE6063001	Computational Physics	2/1		
	DTSC6002001	Data Management and Organization*	2		
	COMP6799001	Database Technology**	2/1		
	English University Courses				
	ENGL6129001	English Savvy	2		
ENGL6131001	English for Written Business Communication	2			
4	COMP6049001	Algorithm Design and Analysis*	4	21	
	DTSC6009001	Survey and Sampling Methods	4		
	COMP6800001	Human and Computer Interaction**	2/1		
	CPEN6247001	Computer Networks	2/1		
	SCIE6062001	Computational Biology	2/1		
	DTSC6007001	Deep Learning	2		
	DTSC6003001	Big Data Infrastructure and Technology*	2		
5	ENTR6511001	Entrepreneurship: Market Validation	2	18	
	COMP6697001	Operating System	2		
	COMP6062001	Compilation Techniques	4		
	COMP6696001	Research Methodology in Computer Science*	2		
	DTSC6008001	Text Mining	2		
	DTSC6004001	Data Security	2		
	COMP6100001	Software Engineering**	4		
6	Enrichment Program I		20	20	
7	Enrichment Program II		20	20	
8	COMP6743001	Pre-Thesis	2	6	
	COMP6744001	Thesis	4		
	COMP6862001	Thesis	6		
			Total Credits 146 SCU		

*) This course is delivered in English

**) Global Learning System Course

English University Courses:

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

-) Students must pass English Savvy with a minimum Grade of 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 Study Program/Program

Enrichment Program I (6th Semester) & Enrichment Program II (7th Semester):

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

Enrichment Track Scheme

Track	Semester 6							Semester 7							
	IN	RS	EN	CD	SA	IS	etc	IN	RS	EN	CD	SA	IS	FS	etc
1	v							v							
2		v							v						
3			v							v					
4				v				v							
5				v							v				
6				v								v			
7					v			v							
8					v						v				
9					v							v			
10							v	v							
11							v				v				
12							v					v			
13	v													v	
14		v												v	
15						v		v							
16						v					v				
17						v						v			

Note:

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

Description:

Student will take one of enrichment program tracks

Students who failed in Enrichment Program I can retake with the same track or change into another track. As for Enrichment Program II, student who failed with Certified Internship, Certified Research, Certified Community Development, and Certified Study Abroad track on Enrichment Program II, can retake with the same track or change into another track. However students who take **Certified Entrepreneurship** track on Enrichment Program II, should **retake with another track**.

Certified Internship Track

Code	Course Name	SCU	Total
Enrichment Program I			20
COMP6771001	Industrial Experience in Data Science	8	
COMP6772001	Data Science Practice in Industrial Experience	8	
COMP6773001	EES in Data Science	4	20
Enrichment Program II			
COMP6774001	Professional Experience in Data Science	8	
COMP6775001	Data Science Practice in Professional Experience	8	
COMP6776001	Professional Development in Data Science	4	

Certified Entrepreneurship Track

Code	Course Name	SCU	Total
Enrichment Program I			20
ENTR6958001	New Venture Initiation in Data Science	8	
ENTR6959001	Product Development Process in Data Science	8	
ENTR6960001	EES in New Data Science Business	4	20
Enrichment Program II			
ENTR6961001	Product Launching in Data Science	8	
ENTR6639001	Business Development in Data Science	8	
ENTR6640001	EES in Data Science Business Experience	4	

Certified Research Track

Code	Course Name	SCU	Total
Enrichment Program I			20
RSCH6562001	Research Experience I	8	
RSCH6580001	Scientific Writing I in Data Science	8	
RSCH6581001	Global EES I (Team Work, Communication, Problem Solving & Decision Making)	4	20
Enrichment Program II			
RSCH6582001	Research Experience II	8	
RSCH6583001	Scientific Writing II in Data Science	8	
RSCH6584001	Global EES II (Self-Management, Planning & Organizing, Initiative & Enterprise)	4	

Certified Community Development Track

Code	Course Name	SCU	Total
Enrichment Program I			20
CMDV6352001	Community Outreach Project Implementation	8	
CMDV6353001	Community Outreach Project Design in Data Science	8	
CMDV6354001	Employability and Entrepreneurial Skills in Data Science Community	4	20
Enrichment Program II			
CMDV6355001	Community Development Project Implementation	8	
CMDV6356001	Community Development Project Design in Data Science	8	
CMDV6357001	Employability and Entrepreneurial Skills in Data Science in Community Development	4	

Certified Study Abroad Track

Code	Course Name	SCU	Total
Elective courses list for study abroad*			20
Enrichment Program I			
GLOB6005001	Elective Course for Study Abroad 1	4	
GLOB6006001	Elective Course for Study Abroad 2	4	
GLOB6007001	Elective Course for Study Abroad 3	4	

Code	Course Name	SCU	Total
GLOB6008001	Elective Course for Study Abroad 4	4	
GLOB6009001	Elective Course for Study Abroad 5	2	
GLOB6010001	Elective Course for Study Abroad 6	2	
GLOB6011001	Elective Course for Study Abroad 7	2	
GLOB6012001	Elective Course for Study Abroad 8	2	
GLOB6013001	Elective Course for Study Abroad 9	2	
GLOB6014001	Elective Course for Study Abroad 10	2	
GLOB6015001	Elective Course for Study Abroad 11	2	
GLOB6016001	Elective Course for Study Abroad 12	2	
GLOB6251001	Elective Course for Study Abroad 29	4	
Enrichment Program II			
GLOB6017001	Elective Course for Study Abroad 13	4	
GLOB6018001	Elective Course for Study Abroad 14	4	
GLOB6019001	Elective Course for Study Abroad 15	4	
GLOB6020001	Elective Course for Study Abroad 16	4	
GLOB6021001	Elective Course for Study Abroad 17	2	
GLOB6022001	Elective Course for Study Abroad 18	2	
GLOB6023001	Elective Course for Study Abroad 19	2	
GLOB6024001	Elective Course for Study Abroad 20	2	
GLOB6025001	Elective Course for Study Abroad 21	2	
GLOB6026001	Elective Course for Study Abroad 22	2	
GLOB6027001	Elective Course for Study Abroad 23	2	
GLOB6028001	Elective Course for Study Abroad 24	2	

*) 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*			
Enrichment Program I			
MICR6033001	Course Certification I	3	
MICR6034001	Technical Skill Enrichment I	4	
MICR6035001	Industrial Project I	9	
MICR6036001	Soft Skill Enrichment I	4	
MICR6001001	Elective Course for Specific Independent Study 1	8	
MICR6002001	Elective Course for Specific Independent Study 2	8	
MICR6003001	Elective Course for Specific Independent Study 3	6	
MICR6004001	Elective Course for Specific Independent Study 4	6	
MICR6005001	Elective Course for Specific Independent Study 5	6	
MICR6006001	Elective Course for Specific Independent Study 6	5	
MICR6007001	Elective Course for Specific Independent Study 7	5	
MICR6008001	Elective Course for Specific Independent Study 8	5	
MICR6009001	Elective Course for Specific Independent Study 9	5	

Code	Course Name	SCU	Total
MICR6010001	Elective Course for Specific Independent Study 10	4	
MICR6011001	Elective Course for Specific Independent Study 11	4	
MICR6012001	Elective Course for Specific Independent Study 12	4	
MICR6013001	Elective Course for Specific Independent Study 13	4	
MICR6014001	Elective Course for Specific Independent Study 14	4	
MICR6015001	Elective Course for Specific Independent Study 15	3	
MICR6016001	Elective Course for Specific Independent Study 16	3	
MICR6017001	Elective Course for Specific Independent Study 17	3	
MICR6018001	Elective Course for Specific Independent Study 18	3	
MICR6019001	Elective Course for Specific Independent Study 19	3	
MICR6020001	Elective Course for Specific Independent Study 20	3	
MICR6021001	Elective Course for Specific Independent Study 21	2	
MICR6022001	Elective Course for Specific Independent Study 22	2	
MICR6023001	Elective Course for Specific Independent Study 23	2	
MICR6024001	Elective Course for Specific Independent Study 24	2	
MICR6025001	Elective Course for Specific Independent Study 25	2	
MICR6026001	Elective Course for Specific Independent Study 26	2	
MICR6027001	Elective Course for Specific Independent Study 27	2	
MICR6028001	Elective Course for Specific Independent Study 28	2	
MICR6029001	Elective Course for Specific Independent Study 29	1	
MICR6030001	Elective Course for Specific Independent Study 30	1	
MICR6031001	Elective Course for Specific Independent Study 31	1	
MICR6032001	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.

Further Study Track

Code	Course Name	SCU	Total
Enrichment Program II (Master of Management Information Systems: Information Systems Strategic Management Stream)			20
ISYS6829001	Digital Technology and Transformation	4	
ISYS6830001	Data Analytics for Business	6	
ISYS6831001	Applied Technology in Information Systems*	4	
ISYS6806001	Strategic Planning for Information Systems	6	
Enrichment Program II (Master of Management Information Systems: Digitalpreneurship Stream)			
ISYS6829001	Digital Technology and Transformation	4	
ISYS6830001	Data Analytics for Business	6	
ISYS6831001	Applied Technology in Information Systems*	4	
ISYS6848001	New Media Ventures and Innovation	6	
Enrichment Program II (Master of Computer Science: Data Science Stream)			20
COMP6816001	Wireless and Cloud Computing Technologies	4	

Code	Course Name	SCU	Total
COMP6997001	IT Disaster Recovery	6	
COMP6981001	Applied Technology in Computer Science*	4	
COMP6998001	Knowledge Engineering	6	
Enrichment Program II (Master of Computer Science: Information Security Management)			
COMP6816001	Wireless and Cloud Computing Technologies	4	
COMP6997001	IT Disaster Recovery	6	
COMP6981001	Applied Technology in Computer Science*	4	
COMP6980001	Networking and Security Concepts	6	

**) Students are required to obtain certification no later than the end of the first semester of the master's (S2) program, as outlined in the university's official guidelines. This certification will be transferred as an undergraduate (S1) course and reported in the seventh semester of the undergraduate program.*

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

No	Course Code	Course Name	Minimal Grade
1.	CHAR6013001	Character Building: Pancasila	B
2.	ENTR6511001	Entrepreneurship: Market Validation	C
3.	COMP6047001	Algorithm and Programming*	C
4.	COMP6048001	Data Structures*	C
5.	COMP6798001	Program Design Methods*	C
6.	COMP6100001	Software Engineering*	C
7.	COMP6799001	Database Technology	C
8.	COMP6697001	Operating System	C

**) Tutorial & Multipaper*