Data Science

Introduction

As the world has entered the era of big data, the need for processing large volumes of data has become essential. The use of big data will form the foundation for competition and growth in industries and businesses. Data science is the key ingredient in this transformation. It combines various information technology tools, statistics, and machine learning to uncover hidden patterns within raw data. This can enhance productivity and create significant value for the global economy by improving the quality of products and services and reducing waste. Students will learn to solve complex data problems by leveraging their strong expertise in Data Science. 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, frontier 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 the Data Science Program can have careers as:

1. Data architect
2. Data engineer
3. Data analyst
4. Data visualizer
5. Database administrator
6. Machine learning scientist
7. Data scientist

Curriculum

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

1. Solid knowledge in big data technology as a framework and solution for data storage.
2. A robust education to enhance logical reasoning skills, essential for mastering data science and solving problems across various fields.
3. The academic environment will foster student learning to develop skills in communicating their data-driven solutions effectively.
4. An environment that promotes active learner independence and empowers students to succeed in their professional careers and fields related to data science.

Furthermore, this department equips students with the knowledge and skills in data science to prepare them for careers as data scientists. These professionals will be able to use the latest technologies to find solutions and draw conclusions based on data. The department also nurtures the development of data science expertise both within Indonesia and internationally, in supporting students in pursuing advanced degrees in this field.

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[2] **(AOL)**	4/2	
	DTSC6001001	Introduction to Data Science[2]	2	
	COMP6798001	Program Design Methods[1] **(AOL)**	2	
	Foreign Language Courses		0	

Sem	Code	Course Name	SCU	Total
2	CHAR6014001	Character Building: Kewarganegaraan	2	20
	MATH6030001	Linear Algebra	2	
	COMP6048001	Data Structures[1&2] **(AOL)**	4/2	
	STAT6171001	Basic Statistics	2	
	ENPR6311001	Creativity and Innovation	2	
	DTSC6013001	Data Mining and Visualization[1&2] **(AOL)**	2	
	COMP6065001	Artificial Intelligence[2] **(AOL)**	4	
	Foreign Language Courses		0	
3	CHAR6015001	Character Building: Agama	2	19
	LANG6027001	Indonesian	2	
	CPEN6247001	Computer Networks **(AOL)**	2/1	
	DTSC6014001	Machine Learning[1&2] **(AOL)**	2	
	MATH6183001	Scientific Computing **(AOL)**	2/1	
	DTSC6002001	Data Management and Organization[1]	2	
	COMP6799001	Database Technology[2] **(AOL)**	2/1	
	DTSC6010001	Bayesian Data Analysis	2	
	Foreign Language Courses		0	
4	COMP6049001	Algorithm Design and Analysis[1] **(AOL)**	4	20
	DTSC6011001	Survey and Sampling Methods	2	
	DTSC6012001	Model Deployment	2	
	COMP6800001	Human and Computer Interaction[2] **(AOL)**	2/1	
	SCIE6063001	Computational Physics **(AOL)**	2/1	
	COMP6697001	Operating System **(AOL)**	2	
	DTSC6007001	Deep Learning	2	
	DTSC6003001	Big Data Infrastructure and Technology[1]	2	
	Foreign Language Courses		0	
5	ENPR6312001	Venture Creation	2	21
	SCIE6062001	Computational Biology	2/1	
	COMP6062001	Compilation Techniques	4	
	COMP6696001	Research Methodology in Computer Science[1] **(AOL)**	2	
	DTSC6008001	Text Mining	2	
	DTSC6004001	Data Security	2	
	COMP6100001	Software Engineering[2] **(AOL)**	4	
	DTSC6015001	Prescriptive Data Science	2	
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

[1]) This course is delivered in English

[2]) Global Learning System course

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

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
ENGL6253001	English for Frontrunners	0
ENGL6254001	English for Independent Users	0
ENGL6255001	English for Professionals	0
JAPN6190001	Basic Japanese Language*	0
CHIN6163001	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*

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	
18		v												v	
19						v		v							

Track	Semester 6							Semester 7							
	IN	RS	EN	CD	SA	IS	etc	IN	RS	EN	CD	SA	IS	FS	etc
20						v					v				
21						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:

1. Students will take only one track in each Enrichment Program.
2. Students who failed in Enrichment Program I can retake according to the table above.
3. As for Enrichment Program II, students who failed should retake the same track, except Certified Specific Independent Study.
4. For those who failed in the Certified Study Abroad track will retake the courses from the home campus.

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	
Enrichment Program II			20
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	
Enrichment Program II			20
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	
Enrichment Program II			20
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	
Enrichment Program II			20
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	
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			20

Code	Course Name	SCU	Total
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	
GLOB6253001	Elective Course for Study Abroad 31	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*			20
CSIS6001001	Course Certification	3	
CSIS6002001	Technical Skill Enrichment	4	
CSIS6003001	Industrial Project	9	
CSIS6004001	Soft Skill Enrichment	4	
CSIS6005001	Elective Course for Specific Independent Study 1	8	
CSIS6006001	Elective Course for Specific Independent Study 2	8	
CSIS6007001	Elective Course for Specific Independent Study 3	6	
CSIS6008001	Elective Course for Specific Independent Study 4	6	
CSIS6009001	Elective Course for Specific Independent Study 5	6	
CSIS6010001	Elective Course for Specific Independent Study 6	5	
CSIS6011001	Elective Course for Specific Independent Study 7	5	
CSIS6012001	Elective Course for Specific Independent Study 8	5	
CSIS6013001	Elective Course for Specific Independent Study 9	5	
CSIS6014001	Elective Course for Specific Independent Study 10	4	
CSIS6015001	Elective Course for Specific Independent Study 11	4	
CSIS6016001	Elective Course for Specific Independent Study 12	4	
CSIS6017001	Elective Course for Specific Independent Study 13	4	
CSIS6018001	Elective Course for Specific Independent Study 14	4	
CSIS6019001	Elective Course for Specific Independent Study 15	3	
CSIS6020001	Elective Course for Specific Independent Study 16	3	
CSIS6021001	Elective Course for Specific Independent Study 17	3	
CSIS6022001	Elective Course for Specific Independent Study 18	3	
CSIS6023001	Elective Course for Specific Independent Study 19	3	

Code	Course Name	SCU	Total
CSIS6024001	Elective Course for Specific Independent Study 20	3	
CSIS6025001	Elective Course for Specific Independent Study 21	2	
CSIS6026001	Elective Course for Specific Independent Study 22	2	
CSIS6027001	Elective Course for Specific Independent Study 23	2	
CSIS6028001	Elective Course for Specific Independent Study 24	2	
CSIS6029001	Elective Course for Specific Independent Study 25	2	
CSIS6030001	Elective Course for Specific Independent Study 26	2	
CSIS6031001	Elective Course for Specific Independent Study 27	2	
CSIS6032001	Elective Course for Specific Independent Study 28	2	
CSIS6033001	Elective Course for Specific Independent Study 29	1	
CSIS6034001	Elective Course for Specific Independent Study 30	1	
CSIS6035001	Elective Course for Specific Independent Study 31	1	
CSIS6036001	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

Students will receive information about Further Study Track Courses during the registration period.

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.	COMP6047001	Algorithm and Programming*	C
3.	COMP6798001	Program Design Methods*	C
4.	COMP6048001	Data Structures*	C
5.	COMP6799001	Database Technology	C
6.	COMP6697001	Operating System	C
7.	COMP6100001	Software Engineering*	C
8.	ENPR6312001	Venture Creation	C

*) Tutorial