Computer Science

Introduction

In this fast-moving era, Computer Science (CS) has gone beyond the simple use of computer software. With the fifth wave of computing (AI, 5G + IoT), the most recent advancement in the computing and technology field, graduates need the ability to understand, create, and support applied computing solutions for their own businesses, their clients, or their employers. This program encourages and challenges students in the areas of:

- Software Engineering
- Cybersecurity
- Artificial Intelligence and Machine Learning
- Data Science and Analytics
- Internet of Things (IoT),
- IT Management and Strategy, and
- Human Computer Interaction.

In becoming familiar with a broad range of information technologies and how they are used, the students develop the ability to specify and manage the implementation of a wide range of applications to support various needs and the ability to design, develop, and implement viable technological solutions using appropriate platforms, tools, and techniques. The program provides the students with the technical, entrepreneurial, and specialized skills needed to develop and design applications across modern platforms, such as Cloud, the Web, and mobile, in a rapidly changing IT environment.

The Computer Science program has an "A" grade accreditation - the highest level of accreditation that can be given to a private higher education program in Indonesia - and it is designed to provide graduates with a thorough understanding of the theories, methods, and systems used by the computing industry. It produces graduates who are knowledgeable and creative, who have excellent programming skills, who are capable of designing, implementing, and maintaining innovative software systems, and who are readily adaptable to new advances in the rapidly changing IT environment. The program provides double degree and intensive specialist courses in interesting computing areas such as:

- Pervasive Software Engineering
- Cloud and Distributed Systems
- Multimedia and Human Computer Interaction
- Web Application Development and Computer Security
- Computer Networks and Security
- Ethical Hacking and Penetration Testing
- Network Forensics
- Games Design and Programming
- Advanced Games Design and Programming
- Technopreneurship
- Data Science
- Artificial Intelligence
- Computational Mathematics (Biology, Physics)

Students experience a vast range of innovative learning processes, from blended learning to experiential; student centered, flipped classroom, and Hackerspace/Makerspace. Students get the opportunity to be future entrepreneurs by getting engaged in a series of entrepreneurial courses (Project Hatchery and Entrepreneurship Hatchery), which focus on technology and provide them the necessary skills and knowledge to create and market their work.

The curriculum also provides a scheme and platform whereby through the 3+1 program, students may choose from creating a startup company, internship, research, or community development work that is suitable for their future goals in the final year of their studies. Students benefit from having an internationally recognized curriculum in an internationally diverse environment, get an opportunity to work on international projects, and attain professional certifications in major areas of the IT industry that will enable them to be successful in their careers.

Vision

A world class study program by providing excellent educational experiences in computer science, fostering and empowering the society in building and serving the nation.

Mission

The mission of Computer 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 computer science 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. To produce graduates who will become successful professionals in ICT fields.
2. To produce graduates who will obtain employment in global companies or become entrepreneurs.
3. To produce graduates who will obtain professional certification or continue their study to the postgraduate level.
4. To produce reputable professionals with the skills to develop creative and impactful software products and services, including but not limited to computer networks and security and games technology.
5. To produce reputable professionals with a solid foundation of mathematical, algorithms, and principles related to computing that will be needed in problem solving practice.
6. To equip graduates with the six (6) key skills (self-management, planning and organizing, team work, problem solving, decision making, initiative and enterprise), adept knowledge and use of a foreign language as well as using information technology and to be of value in the workplace and society.

Student Outcomes

After successful completion of the four-year program, students are expected to be able to:

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.

Able to apply computer science theory and software development fundamentals to produce computing- based solutions.

Prospective Career of the Graduates

Computer Science graduates are able to gain employment as computing professionals in a number of fields, such as systems analysis and design, software engineering, applications software development (enterprise and mobile), network computing (forensics and security), and multimedia production, including graphics, animation, and games. Graduates may join commercial organizations, government institutions, financial institutions, telecommunications companies, IT companies, or other organizations. The career opportunities are unlimited for Computer Science graduates.

A wide range of career opportunities in IT and the computer industry are introduced in which students will be prepared throughout the four years of study. The integrated curriculum is designed and developed to support students in building on their technical and non-technical skills as well as engaging with the industry. Typical starting career positions include:

- Web developer
- Software engineer
- Network administrator
- Computer security professional
- Multimedia systems developer
- Games developer

- Technical artist
- Database developer
- IT sales engineer
- Data Scientist
- Business application developer
- IT project planner

Since computer science graduates are considered engineers, they are also able to obtain employment as professionals in non-IT fields, including sales, marketing, and management. Thus, the career opportunities are unlimited for computer science graduates.

The single-degree program streams provide an internship program for each student, wherein the student may conduct real projects as a practical study within an industrial context. The program develops the student's ability to be involved in professional practices, and ethical and organizational responsibilities. Furthermore, the industrial internship program provides students with real experience in the workplace and teaches them to cope with the work environment. In addition, a series of study/field trips to visiting professionals and industries will be conducted to give good grounds for having a broad overview of the industry. These experiences support individual career aspirations and may provide social and professional networks.

BINUS UNIVERSITY INTERNATIONAL also provides career support for students by disseminating information on the latest job vacancies, internships, and workshops. This support service can be accessed at: www.binuscareer.com.

Award/Degree

- *Sarjana Komputer* from BINUS UNIVERSITY
- Double Degree with Bachelor of Computer Science (B.Com.Sc.) from La Trobe University, Australia
- Double Degree with Bachelor of Information Technology from RMIT University at Melbourne, Australia
- Double Degree with Bachelor of Computer Science from the University of Wollongong at New South Wales,Australia
- Double Degree with Bachelor of Science (Hons.) from the University of Nottingham, United Kingdom

Major and Stream

Stream	Degree				Partner
	Single	Title	Double	Title	
Computer Science	√	S.Kom.			
Pervasive Games Technology	√	S.Kom.			
Software Engineering			√	S.Kom. & B.Comp.Sc.	La Trobe
Information Technology			√	S.Kom. & B.Info.Tech	RMIT
Computer Science			√	S.Kom. & B.Comp.Sc.	Wollongong
Computer Science			√	S.Kom. & B.Sc. (Hons)	Nottingham
Artificial Intelligence			√	S.Kom. & B.Sc. (Hons)	Nottingham

- *Title: S.Kom. (SarjanaKomputer)*
- *B.Sc. (Hons) (Bachelor of Science (Honors)) B.Info.Tech (Bachelor of Information Technology) B.Comp.Sc.(Bachelor of Computer Science)*

Double Degree in Computer Science

In cooperation with La Trobe University, this unique program allows students to gain two degrees while staying full time in Jakarta. In the first part of the program, students undertake courses offered by BINUS and in the second part of the program, students undertake the La Trobe University courses either in Jakarta or have an option to study in Melbourne for at least one semester. This new arrangement of indicates that Binus students are entitled to received two bachelor certificates from Binus University International and La Trobe University without traveling to Australia. Upon satisfactory completion of all course requirements, students are awarded a Bachelor of Science in Computer Science Major in Software Engineering degree from La Trobe University, Melbourne, Australia and a Sarjana Komputer (SKom) degree from BINUS UNIVERSITY.

Double Degree in Information Technology

In cooperation with RMIT University, this double-degree program is designed to provide students with knowledge and practical skills to analyze, design, and implement complex computer software. Students have the opportunity to broaden their horizons and experiences by studying abroad at RMIT University in Australia. The available majors at RMIT include Web and Mobile Computing, Security and Cloud Computing, Data Management, Software Systems Development, Software Systems Analysis, Artificial Intelligence, and Systems Administration.

At the end of the program, students will receive S.Kom. and B.Info.Tech. degrees. Students who would like

to pursue careers in the challenging area of Information Technology are ideal candidates for this program.

Double Degree in Computer Science

In cooperation with the University of Wollongong (UoW), this double-degree program is designed to provide students with knowledge and practical skills to solve real-world problems using computers. The students have the opportunity to broaden their horizons and experiences by studying abroad at the University of Wollongong in Australia. The students who take the double-degree program at the University of Wollongong will receive S.Kom. and B.Comp.Sc. degrees at the end of the program. The available majors at the University of Wollongong include Big Data, Digital Systems Security, Cyber Security, Game and Mobile Development and Software Engineering. Students who would like to pursue careers in the IT industry and business in general are the ideal candidates for this program.

Double Degree in Computer Science (Honors)

In cooperation with the University of Nottingham, this double-degree program is designed to provide students with knowledge and practical skills to solve real world problems using computers. The students have the opportunity to broaden their horizons and experiences by studying abroad at the University of Nottingham, in the United Kingdom. Students shall initially complete three years of study at BINUS in its Computer Science program. Upon successful completion of the three years at BINUS, students shall enroll in year three at one of Nottingham's three-year undergraduate degree programs. Students may progress to the United Kingdom campus. Upon successful completion of the four years of study, students shall receive a degree award from Nottingham, which is either B.Sc. (Hons.) Computer Science or B.Sc. (Hons.) Computer Science with Artificial Engineering, Students will also receive an S.Kom. degree from BINUS UNIVERSITY. Students who would like to pursue careers in the IT industry and business in general are the ideal candidates for this program.

Double Degree in Computer Science

In cooperation with La Trobe University, this unique program allows students to gain two degrees while staying full time in Jakarta. In the first part of the program, students undertake courses offered by BINUS and in the second part of the program, students undertake the La Trobe University courses either in Jakarta or have an option to study in Melbourne for at least one semester. This new arrangement of indicates that Binus students are entitled to received two bachelor certificates from Binus University International and La Trobe University without traveling to Australia. Upon satisfactory completion of all course requirements, students are awarded a Bachelor of Science in Computer Science Major in Software Engineering degree from La Trobe University, Melbourne, Australia and a Sarjana Komputer (SKom) degree from BINUS UNIVERSITY.

Computer Science (Single Degree)

The General Computer Science stream is a single degree program which is designed to provide students with knowledge, as well as practical and creative skills to design, develop, and implement Cloud, Web, Enterprise, Pervasive, and Mobile applications. Students also learn how to design, build, administer, and secure pervasive computer networks. This stream also provides students with the opportunity to become certified ethical hackers, network associates, and professionals.

Pervasive Games Technology (Single Degree)

The Games Technology stream is a single degree program that is designed to provide students with knowledge, as well as practical and creative skills to design and create computer graphics, animations, and interactive games. Students gain competence in the design and development of Interactive and Pervasive games in different

platforms. This stream also provides students with an opportunity to become certified developers in 3D software packages such as Maya, 3DsMax, and Blender, among others. Students who would like to pursue careers in the rapidly expanding games, animation, and creative industries are ideal candidates for this stream.

Teaching, Learning, and Assessment Strategies

- Student's experience a vast range of innovative learning processes, from experiential; student-centered, flipped classroom, to Hackerspace/Makerspace.
- Students get the opportunity to be future entrepreneurs by becoming engaged in a series of entrepreneurial courses which focus on technology and provide them with the necessary skills and knowledge to create and market their work.
- The curriculum also provides a scheme and platform whereby through the 3+1 program, students may choose from doing Entrepreneurship, Internship, Research, or Study Abroad work that is suitable for their future goals in the final year of the study.
- Students enjoy the internationally-recognized curriculum in an internationally diverse environment, receive an opportunity to work on international projects, and attain professional certifications in major areas of the IT industry that will enable them to be successful in their careers.

Study Completion Requirements

Major in Computer Science

To complete a major in Computer Science at BINUS UNIVERSITY INTERNATIONAL, students must complete a minimum of 146 scu's of academic credit.

Course Structure

Sem	Code	Course Name	SCU	Total
1	COMP6798001	Program Design Methods - **(AOL)**	2	20
	COMP6800001	Human and Computer Interaction - **(AOL)**	3	
	COMP6047001	Algorithm and Programming - **(AOL)**	6	
	MATH6025001	Discrete Mathematics	4	
	MATH6183001	Scientific Computing - **(AOL)**	3	
	Pancasila Courses*			
	CHAR6013001	Character Building: Pancasila	2	
	CHAR6039001	Pancasila and Indonesian Culture	2	
2	COMP6048001	Data Structures - **(AOL)**	6	20
	ENGL6171001	Academic English I	3	
	ENTR6091005	Project Hatchery	2	
	COMP6699001	Object Oriented Programming - **(AOL)**	3	
	MATH6031001	Calculus	4	
	MATH6030001	Linear Algebra	2	
3	ENGL6172001	Academic English II	3	19
	CHAR6014001	Character Building: Kewarganegaraan	2	
	COMP6049001	Algorithm Design and Analysis - **(AOL)**	4	
	COMP6784001	Fundamentals of Data Science - **(AOL)**	2	

Sem	Code	Course Name	SCU	Total
	STAT6171001	Basic Statistics	2	
	ENTR6486005	Entrepreneurship Hatchery	3	
	COMP6799001	Database Technology - **(AOL)**	3	
4	LANG6027001	Indonesian	2	19
	CHAR6015001	Character Building: Agama	2	
	CPEN6247001	Computer Networks - **(AOL)**	3	
	COMP6703001	Web Application Development and Security	4	
	COMP6697001	Operating Systems - **(AOL)**	2	
	SCIE6063001	Computational Physics - **(AOL)**	3	
	Elective Courses**			
	COMP6210001	Ethical Hacking and Penetration Testing - **(AOL)**	3	
	GAME6048001	Games Design and Programming - **(AOL)**	3	
5	SCIE6062001	Computational Biology	3	19
	COMP6976001	Data Visualization	4	
	ISYS6815001	Project Management - **(AOL)**	4	
	COMP6705001	Distributed Systems	2	
	COMP6696001	Research Methodology in Computer Science - **(AOL)**	2	
	ISYS6820001	System Analysis and Design	4	
6	COMP6974001	Computational Intelligence for Data Analytics	4	16
	ISYS6818001	Professional Software Development	4	
	COMP6977001	Mobile Application Development	4	
	COMP6975001	Artificial Intelligence Fundamentals - **(AOL)**	4	
7	ISYS6819001	Software Measurement and Testing	4	18
	COMP6978001	Cloud-Based Web Application	4	
	ISYS6817001	Professional Practices and Entrepreneurship in Information Technology	4	
	COMP6979001	Capstone Project	6	
8	**Internship Program*****			15
	COMP6994001	Industry Experience A	8	
	COMP6995001	Software Development Practice	4	
	COMP6996001	Information Technology in Industry	3	
			Total Credits 146 SCU	

) For **Character Building: Pancasila course is offered for Indonesian citizen students, while **Pancasila and Indonesian Culture** course is offered for foreign students.*

**) Student has to choose one of elective courses (each for 3 scu)

***) Courses under the internship program will be conducted concurrently

-) AOL - Assurance of Learning Process System

The Table of Prerequisite for Computer Science

Course		SCU	Sem	Course Prerequisite		SCU	Sem
COMP6049001	Algorithm Design and Analysis	4	3	COMP6047001	Algorithm and Programming	6	1
COMP6784001	Fundamentals of Data Science	2	3	COMP6047001	Algorithm and Programming	6	1
COMP6062001	Compilation Techniques	4	5	COMP6048001	Data Structures	6	2
COMP6703001	Web Application Development and Security	4	4	COMP6699001	Object Oriented Programming	3	2
COMP6065001	Artificial Intelligence	4	5	COMP6049001	Algorithm Design and Analysis	4	3

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.	ENTR6486005	Entrepreneurship Hatchery	C
3.	COMP6047001	Algorithm and Programming	C
4.	COMP6798001	Program Design Methods	C
5.	COMP6048001	Data Structures	C
6.	COMP6799001	Database Technology	C
7.	COMP6697001	Operating Systems	C
8.	ISYS6815001	Project Management	C