

# Computer Science

## Introduction

In this fast-moving era, Computer Science (CS) has gone beyond the simple use of computer software. With the third wave of computing (pervasive computing), 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:

- General CS, and
- Pervasive Games Technology

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
- Games Design and Programming
- Advanced Games Design and Programming
- Technopreneurship
- Intelligent Systems
- Data Science
- Computer Graphics
- Network Forensics

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

To become a leading and world class Computer Science school, which is reputable and excellent in teaching and research, in order to keep relevant with the needs of the global industry and society.

## Mission

1. Educate students from diverse backgrounds with relevant knowledge and skills for the society by providing computer science courses and internships,
2. Prepare graduates to become smart and good IT leaders, innovators, and entrepreneurs in global industries, as well as prepare them for advanced studies,
3. Build strong connections with international academic and non-academic partners and global corporations

## Program Objectives

The objectives of the program are:

1. 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,
2. To produce reputable professionals with a solid foundation of mathematical, algorithms, and principles related to computing that will be needed in problem solving practice,
3. To equip graduates with the skills of communication and utilizing the latest trend in technology to contribute in the global workforce,
4. To produce reputable professionals with the skills to design and implement various computer-networking environment using different security techniques and routing theories to produce secured and robust networks,
5. To produce reputable professionals with the skill to design and develop interactive applications by combining technology with creative art and design concepts to produce an exceptional game application that is able to run in multi-platform environments,
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. Create software application design with the implementation of database system principal design to solve structured and semi-structured data,
2. Design software application solution based on problem analysis which can be solved with structured approach in informatics area assess technology trend in informatics area to deliver alternative solution of software development,
3. Assess technology trend in informatics area to deliver alternative solution of software development,
4. Develop creative and impactful software products and services, including but not limited to computer networks and security and games technology,
5. Apply principles related to computing that is needed in problem solving practice,
6. Communicate and utilize the latest trend in technology to contribute in the global workforce,
7. Acquire skills and knowledge needed to design and implement various computer networking environments using different security techniques and routing theories to produce secured and robust networks,
8. Acquire the necessary skills to design and develop interactive (i.e. games, simulation, etc.) applications by combining technology with creative art and design concepts to produce an exceptional interactive application that is able to run in multi-platform environments,

9. Apply the 6 key skills (self-management, planning and organizing, teamwork, problem solving, decision making, initiative and enterprise) and a foreign language as well as using information technology and to be of value in the workplace and society,
10. Apply interdisciplinary knowledge and skills in developing alternative solutions for problem-solving.

### **Prospective Careers 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 as 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](http://www.binuscareer.com).

## Award/Degree

- *Sarjana Komputer* from BINUS UNIVERSITY
- 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.			
Computer Science			√	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. (Sarjana Komputer)*

*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 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 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.

***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

Semester	Code	Course Name	SCU	Total	
1	LANG6027	Indonesian	2	20	
	COMP6056	Program Design Methods	4		
	COMP6341	Multimedia and Human Computer Interaction	4		
	COMP6502	Introduction to Programming	6		
	COMP6570	Discrete Structures	4		
2	COMP6571	Data Structures and Algorithms	6	20	
	ENGL6171	Academic English I	3		
	ENTR6091	Project Hatchery	2		
	COMP6699	Object Oriented Programming	3		
	COMP6572	Computational Mathematics	6		
3	ENGL6172	Academic English II	3	22	
	COMP6700	Analysis of Algorithms	4		
	COMP6784	Fundamentals of Data Science	2		
	STAT6171	Basic Statistics	2		
	ENTR6486	Entrepreneurship Hatchery	3		
	ISYS6169	Database Systems	6		
	<b>Pancasila Courses*</b>				
	CHAR6013	CB: Pancasila	2		
	CHAR6039	Pancasila and Indonesian Culture	2		
4	CHAR6014	CB: Kewarganegaraan	2	21	
	CPEN6234	Computer Systems and Networks	4		
	COMP6703	Web Application Development and Security	4		
	ENTR6045	Technopreneurship	2		
	COMP6697	Operating Systems	2		
	COMP6062	Compilation Techniques	4		
	<b>Stream: Computer Science</b>				
	COMP6210	Ethical Hacking and Penetration Testing	3		
	<b>Stream: Pervasive Games Technology</b>				
	GAME6048	Games Design and Programming	3		
5	CHAR6015	CB: Agama	2	17	
	COMP6705	Distributed Systems	2		
	COMP6696	Research Methodology in Computer Science	2		
	COMP6506	Pervasive Software Engineering	4		
	COMP6345	Intelligent Systems	4		
	<b>Stream: Computer Science</b>				
	COMP6348	Network Forensics	3		
	<b>Stream: Pervasive Games Technology</b>				
	GAME6046	Advanced Games Design and Programming	3		
6	<b>Enrichment Program I</b>		16	20	
7	<b>Enrichment Program II</b>		16	20	

Semester	Code	Course Name	SCU	Total
8	COMP6753	Pre-Thesis	2	6
	COMP6754	Thesis	4	
<b>TOTAL CREDITS 146 SCU</b>				

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

#### Enrichment Program I (6<sup>th</sup> Semester) & Enrichment Program II (7<sup>th</sup> Semester):

-) Students will take one of the enrichment program tracks (off campus).

#### Enrichment Track Scheme

Track	Semester 6						Semester 7					
	I	RS	ENTR	CD	SA	Other	I	RS	ENTR	CD	SA	Other
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				

Notes:

I : Internship  
 RS : Research  
 ENTR : Entrepreneurship  
 CD : Community Development  
 SA : Study Abroad  
 Other : Program's specific need

Notes:

Student can choose one of the available tracks.

#### Enrichment Internship Track

Code	Course Name	SCU	Total
<b>Enrichment Program I</b>			20
COMP6706	Industry Experience in Information Technology	8	
COMP6751	Software Development Practice	8	
COMP6351	Information Technology in Industry	4	
<b>Enrichment Program II</b>			20
COMP6707	Professional Experience in Information Technology	8	
COMP6752	Software Quality Practice	8	
COMP6354	Information Technology Project Practice	4	

### Enrichment Entrepreneurship Track

Code	Course Name	SCU	Total
<b>Enrichment Program I</b>			20
ENTR6092	Business Model Innovation	8	
ENTR6588	Product and Service Development	8	
ENTR6097	Managing Teams and Cultures	4	20
<b>Enrichment Program II</b>			
ENTR6093	Sustainable Startup Creation	8	
ENTR6587	Business Presentation and Negotiation	8	20
ENTR6098	Business Networking	4	

### Enrichment Research Track

Code	Course Name	SCU	Total
<b>Enrichment Program I</b>			20
RSCH6063	Research Exposure	8	
RSCH6504	Scientific Writing	8	
RSCH6462	Research Ethics	4	20
<b>Enrichment Program II</b>			
RSCH6463	Data Analytics and Testing	8	
RSCH6505	Scientific Publication	8	20
RSCH6465	Communications Research	4	

### Enrichment Study Abroad Track\*

Code	Course Name	SCU	Total
GLOB6085	Elective Course for Study Abroad 1	4	20
GLOB6086	Elective Course for Study Abroad 2	4	
GLOB6087	Elective Course for Study Abroad 3	4	
GLOB6088	Elective Course for Study Abroad 4	4	
GLOB6089	Elective Course for Study Abroad 5	4	
GLOB6043	Elective Course for Study Abroad 1	2	
GLOB6044	Elective Course for Study Abroad 2	2	
GLOB6117	Elective Course for Study Abroad 3	2	
GLOB6046	Elective Course for Study Abroad 4	2	
GLOB6047	Elective Course for Study Abroad 5	2	
GLOB6048	Elective Course for Study Abroad 6	2	
GLOB6049	Elective Course for Study Abroad 7	2	
GLOB6050	Elective Course for Study Abroad 8	2	
GLOB6051	Elective Course for Study Abroad 9	2	
GLOB6052	Elective Course for Study Abroad 10	2	
GLOB6241	Elective Course for Study Abroad 1	3	
GLOB6242	Elective Course for Study Abroad 2	3	
GLOB6243	Elective Course for Study Abroad 3	3	
GLOB6075	Elective Course for Study Abroad 4	3	
GLOB6076	Elective Course for Study Abroad 5	3	
GLOB6260	Elective Course for Study Abroad 6	3	
GLOB6261	Elective Course for Study Abroad 7	3	



\*) The elective courses for study abroad will be transferred to Binus University International's SCU systems based on credit transfer policies.

### The Table of Prerequisite for Computer Science Program

Course		SCU	Sem	Course Prerequisite		SCU	Sem
COMP6700	Analysis of Algorithms	4	3	COMP6056	Program Design Methods	6	1
COMP6784	Fundamentals of Data Science	2	3	COMP6502	Introduction to Programming	6	1
GAME6048	Games Design and Programming	3	4	COMP6502	Introduction to Programming	6	1
COMP6062	Compilation Techniques	4	4	COMP6571	Data Structures and Algorithms	6	2
COMP6703	Web Application Development and Security	4	4	COMP6699	Object Oriented Programming	3	2
GAME6046	Advanced Games Design and Programming	3	5	COMP6502	Introduction to Programming	6	1
COMP6345	Intelligent Systems	4	5	COMP6700	Analysis of Algorithms	4	3

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

No	Code	Course Name	Minimum Passing Grade
1	CHAR6013	Character Building: Pancasila	B
2	ENTR6486	Entrepreneurship hatchery	C
4	COMP6502	Introduction to Programming	C
5	COMP6056	Program Design Methods	C
6	COMP6571	Data Structures and Algorithms	C
7	COMP6506	Pervasive Software Engineering	C
8	COMP6699	Object Oriented Programming	C
9	COMP6703	Web Application Development and Security	C