

## **Computer Science**

### **Introduction**

In the new millennium and the global era, the role of information and automation in the various domains and activities of the business industry are becoming more important. The successes of the activities are determined by its information system. Information must be up-to-date, accurate and comprehensive to allow decision makers to determine the enterprise's strategy. Furthermore, automation can facilitate human activity, accelerate the pace of work and make it more effective and efficient, while also increasing productivity in various activities. The development of communication and computer technology has made it possible to get information that is rapid, exact, and accurate, while increasing the application of automation in various fields such as Industry, business, office affairs and in the development of science and technology.

The Computer Science study program was founded in September 1987, under STMIK BINA NUSANTARA; it became one of the programs under the coordination of the Faculty of Computer Science, BINA NUSANTARA UNIVERSITY in December 1998.

The study of computer science at BINA NUSANTARA UNIVERSITY puts emphasis on the process, techniques, and tools that go into developing computer-based systems, with specialties in object-oriented software engineering, multimedia, web, database and computer network orientation.

### **Vision**

A study program of choice in Computer Science which focuses on developing creative software solutions for industry, is recognized internationally, champions innovation and delivers graduates with international qualifications.

### **Mission**

The mission of Computer Science Department is to contribute to the global community through the provision of world-class education by :

1. Educating students with fundamental and advance knowledge, skill and practice in software development specialized in database technology, intelligence system, networking or multimedia and game development by providing an excellent learning environment and promoting research and collaboration with global industry
2. Providing IT professional services with emphasis in application of knowledge in terms of society development
3. Sharing application of knowledge related to computer science for Indonesian and international community quality of life improvement
4. Promoting students & lecturers to be creative and value-addings talents in computer science by creating suitable environment in order to be able to compete in international level
5. Preparing students for becoming smart and good ICT professionals, leaders and entrepreneurs in global market or for continuing in advanced studies

## **Program Objective**

The objectives of the program are:

1. To provide students with a solid foundation of mathematical, algorithm principles, computer science knowledge and ethical that will be needed in IT practice;
2. To provide students with skills to apply design and development principles in the construction of software system applied in database technology, intelligence system, networking and multimedia development;
3. To prepare students with abilities to keep up-to-date with the latest Information Technology trends, developments and industries;
4. To prepare students with abilities in problem solving and good communication skills to be able to work as an individual or in a team in an IT environment.

## **Student Outcomes**

After completing the study, graduates are:

1. Able to design application by applying of database system design principles to solve structured and semi-structured problems;
2. Able to design application solution based on problem analysis which can be solved using structured approach in informatics field;
3. Able to assess ICT trends to deliver alternative solution in software development;
4. Able to produce applications which can solve the ICT based problems in industry;
5. Able to create database application with high complexity level which can be applied to solve problems in industry;
6. Able to create network based application which can be applied to solve problems in industry;
7. Able to create intelligence application by applying artificial intelligence algorithms;
8. Able to create multimedia based application which can be applied to solve problems in industry.

## **Prospective Career of the Graduates**

After finishing the program, the graduate of Computer Science Study Program could follow a career as:

- |                                       |                           |
|---------------------------------------|---------------------------|
| 1. Software Engineer/Developer        | 7. Data Scientist         |
| 2. System Analyst/Developer           | 8. IT Support/Consultant  |
| 3. Web Engineer/Developer             | 9. Researcher             |
| 4. Computer Network Specialist        | 10. Multimedia Programmer |
| 5. Database Specialist                | 11. Lecturer/Trainer      |
| 6. Artificial Intelligence Specialist |                           |

## **Curriculum**

The present curriculum used in the Computer Science study program has been developed in line with the National Curriculum. Also, the local content has been developed in line with the Computer Science Curriculum standard of ACM (Association for Computing Machineryes), several local and foreign universities, and market trends, so that the graduates of the Computer Science study program are expected to be able to face competition at both a national and international level.

Generally, the subjects of the curriculum 2016 are divided into these following groups of subjects:

### **Mathematics Group (Science)**

The objective of this group is to provide an understanding of mathematics as one of the principal foundations of computer science. Another objective is to give an understanding of scientific methodology (data collection, hypothesis, research, analysis) in problem solving.

### **Character Building Group (Professional Practices)**

The objective of this group is to develop the personal strengths of the student and to provide him or her with a professional character, professionalism in their field, management skills, oral and written communication skills, understanding of business ethic, ability to work as a team, and to develop a “Binusian” Character.

### **Core Group**

The objective of this group is to provide a grounding in Computer Science through practice as well as applied theory which is required by business both now and in the future. The subjects that are included in this group are programming, algorithm design and analysis, software engineering, databases, computer graphs, multimedia, computer and human interaction, operation system, computer architecture, and computer network.

### **Concentration Subject (Stream)**

The objective of this group is to give students the opportunity to obtain a deep understanding of a range of disciplines in computer science. The students are expected to develop their skills and master the techniques which will allow them to conduct research for both their thesis and/or to continue their studies.

The Concentration subjects (Stream) provide:

1. Software Engineering: to explore the various methodologies and software engineering equipment.
2. Intelligent Systems: to explore the various techniques of computer intelligence that can be applied to solving problem.
3. Database Technology: to explore the various technologies and Database Application.
4. Network: to explore computer networking which consists of installation, administration, and computer networking management.
5. Applied Networking (CISCO): to explore computer networking technology based on computer network equipment (CISCO equipment).
6. Interactive Multimedia: to explore computer interactive multimedia applications, based on computer programming, design tools, and software engine.
7. Applied Database: to explore computer specialized technology for database application development based on Oracle product.

### **Entrepreneur and Employability Skill (Internship)**

The objective of this group of subject is to prepare students with professional experience, work ethics and to experience working environment. The students are expected to apply and to practice their knowledge in the real working area such as industry, research lab, and also as entrepreneur start up. And give reports as the result of the subjects.

**Course Structure**

Sem	Code	Course Name	SCU	Total	
1	CHAR6013	Character Building: Pancasila	2	20	
	MATH6025	Discrete Mathematics	4		
	COMP6060	Programming Language Concepts*	2		
	COMP6047	Algorithm and Programming*	4/2		
	MATH6031	Calculus	4		
	<b>English University Courses I</b>				
	ENGL6128	English in Focus	2		
ENGL6130	English for Business Presentation	2			
2	CHAR6014	Character Building: Kewarganegaraan	2	21	
	COMP6048	Data Structures*	4/2		
	MATH6030	Linear Algebra	2		
	COMP6056	Program Design Methods	4		
	COMP6175	Object Oriented Programming*	2/2		
	LANG6061	Indonesian	1		
	<b>English University Courses II</b>				
ENGL6129	English Savvy	2			
ENGL6131	English for Written Business Communication	2			
3	COMP6049	Algorithm Design and Analysis*	4	22	
	ISYS6169	Database Systems	4/2		
	CPEN6098	Computer Networks	2/2		
	COMP6065	Artificial Intelligence*	4		
	ENTR6003	Entrepreneurship I	2		
	CHAR6015	Character Building: Agama	2		
4	STAT6021	Research Methodology	2	23	
	COMP6100	Software Engineering*/**	4		
	COMP6176	Human and Computer Interaction	2/2		
	COMP7084	Multimedia Systems	2/1		
	<b>Streaming: Software Engineering</b>				
	COMP6106	Code Reengineering	4		
	COMP6107	Agile Software Development*	2		
	COMP6114	Pattern Software Design	2/2		
	<b>Streaming : Intelligent System</b>				
	COMP8108	Natural Language Processing*	2/1		
	COMP7066	Expert Systems	2/1		
	COMP7116	Computer Vision	2/2		
	<b>Streaming: Interactive Multimedia</b>				
	COMP7128	Game Design*	2		
	COMP7110	Computer Graphic	2/2		
	COMP7094	Multimedia Programming Foundation	2/2		
<b>Streaming: Database Technology</b>					
ISYS6172	Database Design	2/1			

Sem	Code	Course Name	SCU	Total	
4	COMP6225	Object-Oriented Database	2/2	23	
	COMP6064	Geographical Information System*	2/1		
	<b>Streaming: Applied Database</b>				
	ISYS7155	Applied Database I	4		
	COMP6064	Geographical Information System*	2/1		
	ISYS6172	Database Design	2/1		
	<b>Streaming: Network</b>				
	COMP6113	Network Design	2		
	COMP6120	Network Programming	2/2		
	COMP6132	Linux Operating System*	2/2		
	<b>Streaming: Applied Networking</b>				
	CPEN8092	Applied Networking I	4		
	COMP6113	Network Design	2		
	COMP6120	Network Programming	2/2		
	5	COMP6144	Web Programming*/**		2/1
COMP6062		Compilation Techniques	4		
COMP6153		Operating System	2/2		
ENTR6004		Entrepreneurship II	2		
<b>Elective Course***</b>					
COMP6099		Advanced Object Oriented Programming	2		
MOBI6008		Mobile Game Creative Design	2		
COMP6226		Competitive Programming*	2		
<b>Streaming: Software Engineering</b>					
COMP6115		Object Oriented Analysis & Design*	2/2		
COMP6122		Framework Layer Architecture	2/2		
<b>Streaming : Intelligent System</b>					
COMP7117		Artificial Neural Network*	2/2		
COMP7126		Artificial Intelligence in Games	2/2		
<b>Streaming: Interactive Multimedia</b>					
COMP8129		User Experience	2/2		
COMP7139		Game Programming*	4		
<b>Streaming: Database Technology</b>					
COMP6119		Database Administration*	2/2		
COMP6140		Data Mining	2/2		
<b>Streaming: Applied Database</b>					
ISYS7156		Applied Database II	4		
ISYS7157		Applied Database III	4		
<b>Streaming: Network</b>					
COMP6121	Server Technology	4			
COMP7142	Popular Network Technology*	2/2			

Sem	Code	Course Name	SCU	Total
5	<b>Streaming: Applied Networking</b>			23
	CPEN8093	Applied Networking II	4	
	CPEN8094	Applied Networking III	4	
6	<b>Enrichment Program I</b>		15	15
7	<b>Enrichment Program II</b>		16	16
8	COMP8074	Thesis	6	6
			<b>TOTAL CREDIT 146 SCU</b>	

\*) This course is delivered in English

\*\*) Entrepreneurship Embedded

\*\*\*) Elective Course: students choose one of three elective courses with 2 credits on 5<sup>th</sup> semester.

**English University Courses:**

-) For 1<sup>st</sup> Semester : English University Courses I, student with score Binus University English Proficiency Test less than 500 will take English in Focus, and student with score test greater than or equal to 500 will take English for Business Presentation

-) For 2<sup>nd</sup> Semester: English University Courses II, student with score Binus University English Proficiency Test less than 500 will take English Savvy, and student with score test greater than or equal to 500 will take English for Written Business Communication

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

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

**Enrichment Track Scheme**

Track	Semester 6						Semester 7					
	I	RS	ENTR	CD	SA	*etc	I	RS	ENTR	CD	SA	*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	

Notes:

I : Internship

RS : Research

ENTR : Entrepreneurship

CD : Community Development

SA : Study Abroad

\*etc : Department specific needs

Notes:

Student can choose one of the available tracks.

For students who failed in Entrepreneurship track, they can choose another track besides Entrepreneurship.

**Enrichment Internship Track**

Code	Course Name	SCU	Total
<b>Students who take Internship track in semester 6, should also take internship track in semester 7</b>			15
<b>Enrichment Program I</b>			
COMP6155	Industry Experience I	8	
COMP6331	EES in Industry I	3	
COMP6157	IT Practice in Industry I	4	16
<b>Enrichment Program II</b>			
COMP6161	Industry Experience II	8	
COMP6162	EES in Industry II	4	
COMP6163	IT Practice in Industry II	4	
<b>Enrichment Program II: Students who take Study abroad and community development track in semester 6, should take these courses below if they want to take Internship track in semester 7:</b>			
COMP6158	Industry Experience	8	
COMP6159	EES in Industry	4	
COMP6160	IT Practice in Industry	4	

**Enrichment Entrepreneurship Track**

Code	Course Name	SCU	Total
<b>Enrichment Program I</b>			15
ENTR6328	Business Start Up	8	
ENTR6149	IT Business Model & Validation	2	
ENTR6150	Launching New IT Venture	2	
ENTR6379	EES in New Computer Science Business	3	16
<b>Enrichment Program II</b>			
ENTR6356	Growing a Business	8	
ENTR6151	Lean IT Start Up & Business Plan	2	
ENTR6152	Venture Capital in IT Industry	2	
ENTR6367	EES in Computer Science Business Experience	4	

### Enrichment Research Track

Code	Course Name	SCU	Total
<b>Enrichment Program I</b>			
RSCH6243	Research Experience I	8	15
RSCH6111	Scientific Writing I in Computer Science	4	
RSCH6290	Global EES I (Team Work, Communication, Problem Solving & Decision Making)	3	
<b>Enrichment Program II</b>			
RSCH6258	Research Experience II	8	16
RSCH6112	Scientific Writing II in Computer Science	4	
RSCH6266	Global EES II (Self-Management, Planning & Organizing, Initiative & Enterprise)	4	

### Enrichment Community Development Track

Code	Course Name	SCU	Total
<b>Enrichment Program I</b>			
CMDV6159	Community Outreach Project Implementation	8	15
CMDV6041	Community Outreach IT Project Design	4	
CMDV6203	Employability and Entrepreneurial Skills in Computer Science Community	3	
<b>Enrichment Program II</b>			
CMDV6184	Community Development Project Implementation	8	16
CMDV6042	Community Development IT Project Design	4	
CMDV6193	Employability and Entrepreneurial Skills in Computer Science Community Development	4	

### Enrichment Study Abroad Track

Code	Course Name	SCU	Total
<b>Elective courses list for study abroad*</b>			
<b>Enrichment Program I</b>			
GLOB6005	Elective Course for Study Abroad 1	4	15
GLOB6006	Elective Course for Study Abroad 2	4	
GLOB6007	Elective Course for Study Abroad 3	4	
GLOB6008	Elective Course for Study Abroad 4	4	
GLOB6009	Elective Course for Study Abroad 5	2	
GLOB6010	Elective Course for Study Abroad 6	2	
GLOB6011	Elective Course for Study Abroad 7	2	
GLOB6012	Elective Course for Study Abroad 8	2	
GLOB6013	Elective Course for Study Abroad 9	2	
GLOB6014	Elective Course for Study Abroad 10	2	
GLOB6015	Elective Course for Study Abroad 11	2	
GLOB6016	Elective Course for Study Abroad 12	2	
GLOB6041	Elective Course for Study Abroad 25	3	

Code	Course Name	SCU	Total
GLOB6042	Elective Course for Study Abroad 26	1	16
<b>Enrichment Program II</b>			
GLOB6017	Elective Course for Study Abroad 13	4	
GLOB6018	Elective Course for Study Abroad 14	4	
GLOB6019	Elective Course for Study Abroad 15	4	
GLOB6020	Elective Course for Study Abroad 16	4	
GLOB6021	Elective Course for Study Abroad 17	2	
GLOB6022	Elective Course for Study Abroad 18	2	
GLOB6023	Elective Course for Study Abroad 19	2	
GLOB6024	Elective Course for Study Abroad 20	2	
GLOB6025	Elective Course for Study Abroad 21	2	
GLOB6026	Elective Course for Study Abroad 22	2	
GLOB6027	Elective Course for Study Abroad 23	2	
GLOB6028	Elective Course for Study Abroad 24	2	

\*)Transferred courses will be transferred based on credit transfer policies on study program with total of 15 credits for Enrichment Program I and 16 credits for Enrichment Program II.

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

No.	Code	Course Name	Minimum Grade
1	CHAR6013	Character Building: Pancasila	B
2	ENTR6004	Entrepreneurship II	C
3	COMP6047	Algorithm and Programming*	C
4	COMP6056	Program Design Methods*	C
5	COMP6048	Data Structures*	C
6	COMP6100	Software Engineering*	C
<b>Stream</b>			
<b>Software Engineering</b>			
7	COMP6107	Agile Software Development	C
8	COMP6115	Object Oriented Analysis & Design	C
<b>Database Technology</b>			
7	ISYS6172	Database Design	C
8	COMP6119	Database Administration	C
<b>Intelligent System</b>			
7	COMP7116	Computer Vision	C
8	COMP7117	Artificial Neural Network	C
<b>Network</b>			
7	COMP6120	Network Programming	C
8	COMP6121	Server Technology	C
<b>Applied Networking</b>			
7	COMP6120	Network Programming	C
8	CPEN8093	Applied Networking II	C

No.	Code	Course Name	Minimum Grade
<b>Interactive Multimedia</b>			
7	COMP7094	Multimedia Programming Foundation	C
8	COMP8129	User Experience	C
<b>Applied Database</b>			
7	ISYS6172	Database Design	C
8	ISYS7156	Applied Database II	C

\*) Tutorial & Multipapper