

## **Computer Engineering**

### **Introduction**

The Computer Engineering Department was established in September 1987 under the Faculty of Computer Studies, BINUS UNIVERSITY and has an accreditation of Grade "B". It has various alumni who have gone on to take part in various domains of the business industry. The Computer Engineering Study Program was founded to meet the demand of knowledge about computer systems encompassing computer hardware, software and computer networks.

Well established and world famous organizations, i.e. the Institute of Electrical & Electronic Engineers (IEEE) and the Association for Computing Machinery (ACM), use the following definition:

"Computer engineering embodies the science and the technology of design, construction, implementation and maintenance of the hardware and the software components of modern computing systems and computer-controlled equipment," and its graduates said: "Computer engineers are solidly grounded in the theories and principles of computing, mathematics and engineering, and apply these theoretical principles to design hardware, software, networks, and computerized equipment and instruments to solve problems in diverse application domains."

Hence, graduates of the Computer Engineering Study Program will enjoy knowledge of computer software as well as computer hardware. This will allow graduates to contribute to any kind of application wherever computers are used.

The development of Information Technology and the need for experienced computer systems professionals is behind the innovative Computer Engineering Study Program. Currently the Program covers expertise in understanding to build completed computer system solution that consist of hardware and software, ranging from communication system, embedded systems, robotics and industrial automation in business enterprises. Beside the technical expertise, our student will learn how to become the entrepreneur in the information technology, that we call Technopreneur. All these aspects of study are included in the curriculum which is divided into three concentration fields starting in the fifth semester. To give working experiences for student, we offer internship program for student in 6<sup>th</sup> or 7<sup>th</sup> semester, also offering industrial applied research activities with their lecturer. In principle, the curriculum is derived from the curriculum developed by IEEE/ACM and by conducting benchmarking activities with other prestigious domestic and foreign universities. Additionally, the research activities which are conducted by students and lecturers continue to expand due to various sources of funding (industries, government, etc).

The Computer Engineering Study Program supported by 90% S2/S3 lecturers. The laboratories that support the Computer Engineering Study Program include Algorithm & Programming Laboratory, Computer Network Laboratory, Electronic & Digital System Laboratory, Control System Laboratory, Embedded System Laboratory, Digital Signal Processing Laboratory, Mechatronic Laboratory, and Robotic Laboratory.

### **Vision**

A study program of choice in Computer Engineering, which focuses on Intelligence, Mobility, and Secure Communication technologies, is recognized internationally, champions innovation and produces graduates with international qualification.

## Mission

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

1. Educating students with the knowledge and skills in science and technology in the design, analysis and application of intelligent, mobile, and secure connectivity technologies. We prepare graduates to be ethical professionals and technopreneurs, as well as to continue for advanced degrees in computer engineering or related disciplines in global community.
2. Providing a vibrant learning and research environment that nurtures the most creative, value-added and leadership talents of our graduates for the global community.
3. Improving quality of life by conducting professional services and high impact applied research in Computer Engineering related disciplines.

## Program Objectives

The objectives of the program are:

1. Excel in methodological and computational skills within their professional and communities.
2. Employ effective team player and professional responsibilities to benefit the organizations and society.
3. Sustainably updating their knowledge to meet evolving global requirements.

## Graduate Competencies

At the end of the program, graduates will have these following outcomes :

1. An ability to apply knowledge of math, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. An ability to identify, formulate, and solve computer engineering problems.
5. An ability to use the techniques, skills, and modern computer engineering tools necessary for engineering practice.
6. An ability to function on multidisciplinary teams.
7. An understanding of professional and ethical responsibility.
8. An ability to communicate effectively.
9. The broad education necessary to understand the impact of computer engineering solutions in a global, economic, environmental, and societal context.
10. A recognition of the need for, and an ability to engage in life-long learning.
11. A knowledge of contemporary issues.

## Prospective Career of the Graduates

- Technopreneur
- Industrial Control System Developer and Engineer
- Network Designer and Engineer
- Computer Network Security Professional
- Embedded System Developer
- Research and Development in Robotics
- IT Consultant

## Curriculum

Information Technology is developing rapidly, particularly in the fields of data communication, computer networks, robotics, manufacturing and process industries, household appliances, as well as in the support of management activities. Therefore, the curriculum of the Computer Engineering Study Program is divided into three core subjects:

1. **Communication System:** study in the design and management of data communications, computer network (LAN, WAN, Wireless Network) using industry standard curriculum and equipment from CISCO System, and Computer Network Security that we believe will play important role in the future.
2. **Embedded System:** study in the design and development of ubiquitous computer and electronic system that can run independently without or less human intervention. The embedded system covers from simple 8-bit microcontroller up to high performance Embedded ARM Linux and FPGA-based system design.
3. **Robotics and Automation (control, vision & intelligence):** analysis of dynamic systems, control, computer vision, and artificial intelligence system and applications related to how computers can interact with human being via robots in an autonomous fashion.

The student normally finish their study in eight semesters. In special circumstances some students are able to complete the Program in seven semesters.

## Course Structure

Sem	Code	Course Name	SCU	Total	
1	CHAR6013	Character Building: Pancasila	2	20	
	SCIE6004	Physics I	4		
	MATH6006	Chemistry	4		
	MATH6093	Calculus	4		
	CPEN6078	Introduction to Computer Engineering	4		
	<b>English University Courses I</b>				
	ENGL6128	English in Focus	2		
	ENGL6130	English for Business Presentation	2		
2	CHAR6014	Character Building: Kewarganegaraan	2	20	
	SCIE6005	Physics II	4/2		
	COMP6047	Algorithm and Programming	4/2		
	MATH6005	Engineering Mathematics I	4		
	<b>English University Courses II</b>				
	ENGL6129	English Savvy	2		
	ENGL6131	English for Written Business Communication	2		
3	MATH6007	Engineering Mathematics II	4	22	
	MATH6036	Discrete Mathematics	2		
	COMP6014	Introduction to Data Structure	2		
	STAT6026	Probability and Statistics	2		
	CPEN6079	Electric Circuit Theory	2/1		
	CPEN6080	Electronic Devices	4/1		
	ENTR6003	Entrepreneurship I	2		
	CHAR6015	Character Building: Agama	2		

Sem	Code	Course Name	SCU	Total	
4	CPEN6081	Digital System*	5/1	21	
	CPEN6099	Signal and System	4		
	MATH6044	Numerical Methods	2		
	CPEN6046	Computer Networks	4/1		
	CPEN6082	High Level Programming Language	2		
	COMP6083	Operating Systems	2		
5	CPEN6100	Control System	2/2	21/23/22	
	CPEN6073	Assembly Language	2/1		
	CPEN6075	Computer System Development and Methodology	2		
	ENTR6004	Entrepreneurship II	2		
	CPEN6083	Digital Signal Processing	2/1		
	<b>Stream: Robotics and Automation</b>				
	CPEN6028	Actuators and Sensors	2		
	CPEN6033	Simulation and Modeling	2		
	CPEN6067	Artificial Neural Network	2/1		
	<b>Stream: Embedded System</b>				
	CPEN6062	Cross Platform Application Development	4/1		
	CPEN6063	Advanced Logic Design	4		
	<b>Stream: Communication System</b>				
	CPEN8092	Applied Networking I	4		
CPEN6064	Communication Transmission System	2/2			
6	CPEN6034	Computer Organization and Architecture	4	23/19/23	
	CPEN6084	Microcontroller Design and Application*	5/1		
	CPEN6074	Research Methodology	2		
	<b>Stream: Robotics and Automation</b>				
	CPEN6061	Advanced Digital Signal Processing	4		
	CPEN6085	Advanced Control System	2/1		
	CPEN6066	Robotics Fundamental	2/2		
	<b>Stream: Embedded System</b>				
	CPEN6028	Actuators and Sensors	2		
	CPEN6086	Advanced Large Scale Integration System Design	4/1		
	<b>Stream: Communication System</b>				
	CPEN8093	Applied Networking II	4		
	CPEN6087	Wireless and Mobile Technology	4		
	CPEN8076	Network Security Fundamental	2/1		
7	ISYS6078	Database Design and Application	2/1	13/15/12	
	CPEN6035	Parallel Processing	2		
	<b>Stream: Robotics and Automation</b>				
	CPEN6070	Robotics and Industrial Automation	4/1		
	COMP7067	Computer Vision	2/1		
	<b>Stream: Embedded System</b>				
	CPEN6071	Embedded Linux System Development	4/2		
	CPEN6072	Mobile Application Development	2/2		
	<b>Stream: Communication System</b>				
	CPEN6043	Network Management	2/1		
CPEN8077	Applied Network Security	4			
8	CPEN6110	Final Project	6	6	
<b>TOTAL CREDIT 146 SCU</b>					

\*) *Entrepreneurship Embedded*

**English University Courses:**

- ) *For 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 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*

**The Table of Prerequisite for Computer Engineering (S1)**

Subject		Credits	Prerequisites		Credits
MATH6007	Engineering Mathematics II	4	MATH6093	Calculus	4
CPEN6082	High Level Programming Language	2	COMP6047	Algorithm and Programming	4/2
CPEN6084	Microcontroller Design and Application	5/1	CPEN6081	Digital System	5/1

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

No.	Code	Course Name	Minimum Grade
1	CHAR6013	Character Building: Pancasila	B
2	ENTR6004	Entrepreneurship II	C
3	MATH6093	Calculus*	C
4	COMP6047	Algorithm and Programming*	C
5	CPEN6081	Digital System*	C
6	CPEN6084	Microcontroller Design and Application	C
<b>Stream: Robotics and Automation</b>			
7	CPEN6066	Robotics Fundamental	C
8	CPEN6085	Advanced Control System	C
<b>Stream: Embedded System</b>			
7	CPEN6086	Advanced Large Scale Integration System Design	C
8	CPEN6071	Embedded Linux System Development	C
<b>Stream: Communication System</b>			
7	CPEN8093	Applied Networking II	C
8	CPEN8077	Applied Network Security	C

\*) Tutorial & Multipaper