

## **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. To provide students with a fundamental knowledge of scientific, engineering, and professional principles that are essential to the practice of computer engineering.
2. To provide students with the methodological and computational skills within Computer Engineering that enable them to be successful in their career
3. To prepare students with team work and social responsibility skills, and support them to be successful as ethical citizens and global team players.
4. To provide students with the ability to meet the needs of a rapidly changing world by continually updating and renewing their knowledge throughout their careers.

## **Graduate Competencies**

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

1. An ability to apply knowledge of mathematics, 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	CB412	CB: Self Development	2	20
	D0684	Physics I	4	
	H0874	Chemistry	4	
	K0314	Calculus	4	
	G1372	English Entrant	2	
	H0884	Introduction to Computer Engineering	4	
2	CB422	CB: Spiritual Development	2	20
	D0696	Physics II	4/2	
	T0016	Algorithm and Programming	4/2	
	H0864	Engineering Mathematics I	4	
	G1382	English in Focus	2	

Sem	Code	Course Name	SCU	Total	
3	H0894	Engineering Mathematics II	4	22	
	K0362	Discrete Mathematics	2		
	H0903	Electric Circuit Theory	2/1		
	H0915	Electronic Devices	4/1		
	H0612	Introduction to Data Structure	2		
	I0262	Probability and Statistics	2		
	G1392	English Savvy	2		
EN001	Entrepreneurship I	2			
4	CB432	CB: Interpersonal Development	2	21	
	H0926	Digital System*	5/1		
	H0572	Signal and System	2		
	K0572	Numerical Methods	2		
	H0515	Computer Networks	4/1		
	H0932	High Level Programming Language	2		
	T0542	Operating Systems	2		
5	H0622	Control System	2	21/23/22	
	H0803	Assembly Language	2/1		
	H0822	Computer System Development and Methodology	2		
	EN002	Entrepreneurship II	2		
	CB442	CB: Professional Development	2		
	H0943	Digital Signal Processing	2/1		
	<b>Stream : Robotics and Automation</b>				
	H0272	Actuators and Sensors	2		
	H0332	Simulation and Modeling	2		
	H0733	Artificial Neural Network	2/1		
	<b>Stream : Embedded System</b>				
	H0685	Cross Platform Application Development	4/1		
	H0694	Advanced Logic Design	4		
	<b>Stream : Communication System</b>				
	T0374	Applied Networking I	0/4		
H0704	Communication Transmission System	2/2			

Sem	Code	Course Name	SCU	Total	
6	H0344	Computer Organization and Architecture	4	23/19/23	
	H0956	Microcontroller Design and Application*	5/1		
	H0812	Research Methodology	2		
	<b>Stream : Robotics and Automation</b>				
	H0674	Advanced Digital Signal Processing	4		
	H0963	Advanced Control System	2/1		
	H0724	Robotics Fundamental	2/2		
	<b>Stream : Embedded System</b>				
	H0272	Actuators and Sensors	2		
	H0975	Advanced Large Scale Integration System Design	4/1		
	<b>Stream : Communication System</b>				
	T0384	Applied Networking II	0/4		
	H0984	Wireless and Mobile Technology	4		
	H0833	Network Security Fundamental	2/1		
7	H0763	Database Design and Application	2/1	13/15/12	
	H0352	Parallel Processing	2		
	<b>Stream : Robotics and Automation</b>				
	H0775	Robotics and Industrial Automation	4/1		
	T0283	Computer Vision	2/1		
	<b>Stream : Embedded System</b>				
	H0786	Embedded Linux System Development	4/2		
	H0794	Mobile Application Development	2/2		
	<b>Stream : Communication System</b>				
	H0493	Network Management	2/1		
H0844	Applied Network Security	4			
8	H0446	Thesis	6	6	
	<b>Elective Courses</b>				
	G1402	English for Business Presentation	2		
	G1412	English for Written Business Communication	2		
<b>TOTAL CREDIT 146</b>					

\*) Entrepreneurship Embedded

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

Subject	Credits	Prerequisites	Credits	
H0894	Engineering Mathematics II	4	K0314   Calculus	4
H0932	High Level Programming Language	2	T0016   Algorithm and Programming	4/2
H0956	Microcontroller Design and Application	5/1	H0926   Digital System	5/1

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

No	Code	Course Name	Minimum Grade
1	CB412	CB: Self Development	B
2	EN002	Entrepreneurship II	C
3	K0314	Calculus*	C
4	T0016	Algorithm and Programming*	C
5	H0926	Digital System*	C
6	H0956	Microcontroller Design and Application	C
<b>Stream</b>			
<b>Stream : Robotics and Automation</b>			
7	H0724	Robotics Fundamental	C
8	H0963	Advanced Control System	C
<b>Stream : Embedded System</b>			
7	H0975	Advanced Large Scale Integration System Design	C
8	H0786	Embedded Linux System Development	C
<b>Stream : Communication System</b>			
7	T0384	Applied Networking II	C
8	H0844	Applied Network Security	C

\*) Tutorial & Multipaper