Computer Engineering

Introduction

The Computer Engineering (CEN) study program was established in September 1987 under the Faculty of Computer Studies and since 2011 are under Faculty of Engineering Binus University. The CEN Program is **accredited Grade "A" by the National Board of Higher Education (BAN-PT)** in 2013 and also **accredited by the Engineering Accreditation Commission of ABET**, www.abet.org in 2015. It has various alumni who have gone on to take part in various domains of the business industry. The CEN 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 CEN 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 CEN 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.

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 technopreuners, as well as to continue for advanced degrees in computer engineering or related disciplined 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.

Student Outcomes

After completing the study, graduates are:

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

1. Engineering Specialist
2. System Design Engineer
3. Computer System Engineer
4. Integrated Circuit Engineer
5. Embedded System Developer
6. Soft Embedded Programmer
7. Network Administrator
8. Network Designer
9. Computer Network Security Professional
10. Engineering Manager
11. Quality Control Engineer,
12. Marketing Engineer
13. Industrial Control System Engineer
14. Technopreneur

Curriculum

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). At present, there is still a high demand for Computer Engineering graduates due to the developments in information technology. As such the business industry needs to respond to these demands by providing a knowledgeable workforce which is also able to keep up with the rapid changes in the industry. Graduates of the CEN Program are expected to have competences such as ability to work with integrity, independently and professionally, ability to work as a master of Computer Engineering who understands Communication System, Embedded System Development and Intelligent Industrial Automation Systems. Moreover, they trained to have the ability to pursue a higher level of education and have motivation to keep up with the changes in technology via research and development activities.

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 two concentration fields** starting in the fifth semester. Therefore, the curriculum of the Computer Engineering Study Program is divided into two core subjects:

1. **Intelligent Embedded Systems:** study in the design and development of ubiquitous computer and intelligent electronic systems 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.

2. **Communication System:** study in the design and management of data communications, computer network (LAN, WAN, Wireless Network), and computer network security that we believe will play important role in the future.

The internship program is designed in 6th and 7th semester for providing students with real world experience. The CEN Program is supported by lecturers with distinguished expertise in Computer Engineering fields. The laboratories that support the CEN Program include Physics Laboratory, Algorithm & Programming Laboratory, Electronics & Digital Systems Laboratory, Computer Network Laboratory, Control System Laboratory, Embedded System Laboratory, Communication System Laboratory, Intelligent Signal Processing Laboratory, and Robotics & Automation Laboratory

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	
	English University Courses I			
	ENGL6128	English in Focus	2	
	ENGL6130	English for Business Presentation	2	

Sem	Code	Course Name	SCU	Total
2	CHAR6014	Character Building: Kewarganegaraan	2	21
	SCIE6005	Physics II	4/2	
	COMP6154	Algorithm and Programming Fundamentals	4	
	MATH6005	Engineering Mathematics I	4	
	MATH6036	Discrete Mathematics	2	
	LANG6061	Indonesian	1	
	English University Courses II			
	ENGL6129	English Savvy	2	
	ENGL6131	English for Written Business Communication	2	
3	MATH6007	Engineering Mathematics II	4	22
	STAT6026	Probability and Statistics	2	
	MATH6044	Numerical Methods	2	
	CPEN6123	Circuits and Signals	4/1	
	CPEN6080	Electronics Devices*	4/1	
	ENTR6003	Entrepreneurship I	2	
	CHAR6015	Character Building: Agama	2	
4	CPEN6034	Computer Organization and Architecture*	4	24
	CPEN6081	Digital System**	5/1	
	CPEN6083	Digital Signal Processing*	2/1	
	CPEN6124	Digital Communication Systems	4	
	CPEN6046	Computer Networks	4/1	
	COMP6083	Operating Systems	2	
5	CPEN6084	Microcontroller Design and Application**	5/1	22
	ISYS6078	Database Design and Application	2/1	
	ENTR6004	Entrepreneurship II	2	
	CPEN6075	Computer System Development and Methodology*	2	
	Stream : Intelligent Embedded Systems			
	CPEN6125	Computational Intelligence	4/1	
	CPEN6126	Cross Platform Application Development	4	
	Stream : Communication System			
	CPEN6127	Network Infrastructure Technology	4/1	
	CPEN6128	Mobile Communications and Cyber Security	4	
6	**Enrichment Program I**		15	15
7	**Enrichment Program II**		16	16
8	CPEN6110	Final Project	6	6
			TOTAL CREDIT 146 SCU	

*) This course is delivered in English

**) Entrepreneurship Embedded

English University Courses:

-) *For 1st 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 2nd 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 (6th Semester) & Enrichment Program II (7th 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				
13			v						v			
14			v							v		
15			v								v	
16				v			v					
17				v				v				
18				v					v			
19				v						v		
20				v							v	
21					v		v					
22					v			v				
23					v				v			
24					v					v		
25					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

Enrichment Internship Track

Code	Course Name	SCU	Total
Enrichment Program I			
CPEN6129	Computer Engineering Practical Experience I : For Industry Practice	8	15
CPEN6130	Computer Engineering Technical Analysis I : For Industry Practice	4	
CPEN6147	Computer Engineering EES Experience I : For Industry Practice	3	
Enrichment Program II			
CPEN6133	Computer Engineering Practical Experience II : For Industry Practice	8	16
CPEN6134	Computer Engineering Technical Analysis II : For Industry Practice	4	
CPEN6136	Computer Engineering EES Experience II : For Industry Practice	4	

Enrichment Entrepreneurship Track

Code	Course Name	SCU	Total
Enrichment Program I			
ENTR6188	Computer Engineering Practical Experience I : For Entrepreneurship - Business Start Up	8	15
ENTR6189	Computer Engineering Technical Analysis I : For Entrepreneurship - Business Model & Validation	2	
ENTR6190	Computer Engineering Technical Analysis I : For Entrepreneurship - Launching New Venture	2	
ENTR6191	Computer Engineering EES Experience I: For Entrepreneurship – EES in New Business	3	
Enrichment Program II			
ENTR6192	Computer Engineering Practical Experience II : For Entrepreneurship - Growing a Business	8	16
ENTR6193	Computer Engineering Practical Experience II : For Entrepreneurship - Lean Start Up & Business Plan	2	
ENTR6194	Computer Engineering Practical Experience II : For Entrepreneurship - Venture Capital	2	
ENTR6195	Computer Engineering Practical Experience II : For Entrepreneurship - EES in Business Experience	4	
Enrichment Program II: *(For students who only take Entrepreneurship track in semester 7, should take these courses:)*			
ENTR6241	Computer Engineering Practical Experience II : For Entrepreneurship - Business Start Up	8	16
ENTR6242	Computer Engineering Technical Analysis II : For Entrepreneurship - Business Model & Validation	2	
ENTR6243	Computer Engineering Technical Analysis II : For Entrepreneurship - Launching New Venture	2	
ENTR6196	Computer Engineering EES Experience II: For Entrepreneurship – EES in New Business	4	

Enrichment Research Track

Code	Course Name	SCU	Total
Enrichment Program I			
RSCH6139	Computer Engineering Practical Experience I : For Research Practice	8	15
RSCH6140	Computer Engineering Technical Analysis I : For Research Practice	4	
RSCH6141	Computer Engineering EES Experience I : For Research Practice	3	
Enrichment Program II			
RSCH6142	Computer Engineering Practical Experience II : For Research Practice	8	16
RSCH6143	Computer Engineering Technical Analysis II : For Research Practice	4	
RSCH6144	Computer Engineering EES Experience II : For Research Practice	4	

Enrichment Community Development Track

Code	Course Name	SCU	Total
Enrichment Program I			
CMDV6059	Computer Engineering Practical Experience I : For Community Development Project	8	15
CMDV6060	Computer Engineering Technical Analysis I : For Community Development Project	4	
CMDV6061	Computer Engineering EES Experience I: For Community Development Project	3	
Enrichment Program II			
CMDV6062	Computer Engineering Practical Experience II : For Community Development Project	8	16
CMDV6063	Computer Engineering Technical Analysis II : For Community Development Project	4	
CMDV6064	Computer Engineering EES Experience II: For Community Development Project	4	

Enrichment Study Abroad Track*

Code	Course Name	SCU	Total
Elective courses list for study abroad*			
Enrichment Program I			
GLOB6005	Elective Course for Study Abroad 1	4	
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	15
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	
GLOB6042	Elective Course for Study Abroad 26	1	
Enrichment Program II			
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	16
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.

The Table of Prerequisite for Computer Engineering (S1)

Subject		Credits	Sem	Prerequisite		Credits	Sem
MATH6007	Engineering Mathematics II	4	3	MATH6093	Calculus	4	1
CPEN6034	Computer Organization and Architecture	4	4	COMP6154	Algorithm and Programming Fundamentals	4	2
CPEN6084	Microcontroller Design and Application	5/1	5	CPEN6123	Circuits and Signals	4/1	3

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	MATH6093	Calculus*	C
4	COMP6154	Algorithm and Programming Fundamentals*	C
5	CPEN6123	Circuits and Signals*	C
6	CPEN6084	Microcontroller Design and Application	C
Stream: Intelligent Embedded Systems			
7	CPEN6125	Computational Intelligence	C
8	CPEN6126	Cross Platform Application Development	C
Stream: Communication System			
7	CPEN6127	Network Infrastructure Technology	C
8	CPEN6128	Mobile Communications and Cyber Security	C

*) Tutorial & Multipaper