THE MINISTRY OF EDUCATION AND TRAINING
HCMC UNIVERSITY OF TECHNOLOGY AND EDUCATION
FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNDERGRADUATE PROGRAMME

BACHELOR OF

ELECTRONICS AND COMMUNICATION ENGINEERING TECHNOLOGY

(52510302)

JANUARY - 2016

UNDERGRADUATE PROGRAMME
(Full-time Curriculum)

Programme: Electronics and Communication Engineering Technology

Level: Undergraduate

Major: Electronics and communication engineering technology

Programme duration: 4 years

(Decision No……date… on……..)

1- Enrollment, Grading System, Curriculum and Graduation Requirements

- *Enrollment***:** High-school Graduates
- *Grading system*: 10
- *Curriculum and Graduation Requirements*: Based on regulations of Decision No 43/2007/BGDDT

2- The Goals, Objectives, and Expected Learning Outcomes

Goals:

The programme is designed to prepare graduates to assume engineering and technology positions in the electronics and communications industry. Graduates of Electronics and Communications Engineering Technology (ECET) programme have an ability to demonstrate expertise and career advancement in Electronics and Communications field through the application of fundamental knowledge, skills, and engineering technology tools. They also have potential to contribute significantly to the achievement of their organization's goals as an effective member and an ability to take part in life-long learning by being engaged with civic institutions, educational organizations, and professional societies.

Objectives:

PEO-01	Excel in their engineering careers and/or postgraduate education by utilizing the fundamental mathematical, scientific, and engineering technology principles in formulating and solving electronics and communication engineering problems
PEO-02	Communicate and work effectively in multidisciplinary teams and continue career-long professional development through engagement in lifelong learning
PEO-03	Fulfill the needs of society in solving technical problems using engineering principles, tools and practices, in an ethical and professional manner
PEO-04	Make technical contributions to design, development, and manufacturing in their practice of electronics and communication engineering technology

Expected Learning Outcomes:

ELO-01	An ability to apply knowledge of mathematics, science, computer fundamentals, and engineering

ELO-02	An ability to identify, formulate and solve engineering problems and to design a system, component, or process to meet desired needs
ELO-03	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
ELO-04	An ability to apply written, oral, and graphical communication in both technical and non-technical environments
ELO-05	An ability to communicate in English
ELO-06	An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting
ELO-07	A recognition of the need for continuous learning, and an ability to engage in life-long learning
ELO-08	An ability to understand the tenants of professional codes of ethics and to apply ethical considerations to realistic problems
ELO-09	Recognize the importance of the global, economic, environmental and societal context in engineering practice
ELO-10	An ability to conduct standard tests and measurements, and to conduct, analyze, and interpret experiments related to electronics and communication engineering technology
ELO-11	Demonstrate the application of circuit analysis and design, computer programming, associated software, analog and digital electronics, and microcomputers, and engineering technology standards to the building, testing, operation, and maintenance of electronics/ communication systems

3- Blocks of knowledge in the whole programme: 150 credits (without Physical Education and National Defense Education knowledge)

4- Block of knowledge

Name	Credits		
	Total	**Compulsion**	**Elective**
General knowledge	**56**	**50**	**06**
Political Education	12	12	0
Social Science	06	0	06
English	09	09	0
Mathematics and Natural Sciences	23	23	0
Informatics	03	03	0
Introduction to ECET	03	03	0
Professional knowledge	**94**	**85**	**09**
Electrical and Electronics Core	26	26	0
Electrical and Electronics Advanced Core	23	23	0
Electronics and Communications Specialization	33	24	9
Graduation Thesis and Internship	12	12	0

5- Programme content

a. General knowledge: 56 Credits

No.	Course Prefix and Number	Course Title	Cr.	Note
A	**Political Education and General Laws**		**12**	
1	LLCT150105	Principles of Marxist-Leninism	5	
2	LLCT120314	Ho Chi Minh's Ideology	2	
3	LLCT230214	Vietnamese Communist Party Policy of Revolution	3	
4	GELA220405	General Laws	2	
B	**Introduction to ECET**		**3**	
1	IEET130145	Introduction to ECET	3	
C	**Informatics**		**3**	
1	CPRL130064	C Program Language	3	
D	**Foreign Language**		**9**	
1	ENGL130137	English 1	3	
2	ENGL230237	English2	3	
3	ENGL330337	English 3	3	
E	**Mathematics and Natural Sciences**		**23**	
1	MATH130101	Advanced Mathematics 1	3	
2	MATH130201	Advanced Mathematics 2	3	
3	MATH130301	Advanced Mathematics 3	3	
4	MATH130401	Applied Probability	3	
5	PHYS120102	General Physics A1	3	
6	PHYS120202	General PhysicsA2	2+1	
7	MATH121201	Complex Functions and Laplace Transforms	2	
8	GCHE130103	General Chemistry A1	3	
F	**Social Science (Select 03 free elective courses)**		**6**	
1	GEEC220105	General Economics	2	
2	PLSK320605	Planning Skill	2	
3	INMA220305	Introduction to Management	2	
4	INSO321005	Introduction to Sociology	2	
5	IQMA220205	Introduction to Quality Management	2	
6	INLO220405	Introduction to Logic	2	
7	PRSK320705	Presentation Skills	2	
8	SYTH220505	Systems Thinking	2	
9	ULTE121105	University Learning Method	2	

10	IVNC320905	Vietnamese Culture	2	
11	TDTS320805	Technical Writing	2	
G	**Physical Education**		**5**	
1	PHED110513	Physical Education 1	1	
2	PHED110613	Physical Education 2	1	
3	PHED130715	Physical Education 3 (Elective)	3	
H	**National Defense Education**		**11**	

b. Professional education knowledge: 94 credits

No.	Course Prefix and Number	Course Title	Cr.	Note
A	**Electrical and Electronics Core**		**26**	
1	ELCI140144	Electric Circuit	4	
2	BAEL340662	Basic Electronics	4	
3	DIGI330163	Digital Systems	3	
4	EMIN330244	Electrical Measurement and Instruments	3	
5	MICR330363	Microprocessor	3	
6	ELSA320245	Electrical Safety	2	
7	ELPR320762	Electronics Lab	2	
8	PMEM310844	Measurement Engineering Lab	1	
9	PRDI320263	Digital Systems Lab	2	
10	PRMI320463	Microprocessor Lab	2	
B	**Electrical and Electronics Advanced Core**		**23**	
1	SISY330164	Signals and Systems	3	
2	DACO430664	Data Communication	3	
3	DSPR431264	Digital Signal Processing	3	
4	COEL330264	Communication Electronics	3	
5	DSIC330563	Digital Systems Design with HDLs	3	
6	EMSY437764	Embedded Systems	3	
7	LDAT411164	Data Communication Lab	1	
8	PRDS320663	Digital Systems Design with HDLs Lab	2	
9	ESPR427064	Embedded Systems Lab	2	
C	**Electronics and Communications Specialization**		**33**	

C.1	***Integrated-Circuits and Communications Area***			
I	*Compulsory Courses*		*24*	
1	ELFI220344	Electromagnetic Field	*2*	
2	MIEN330364	Microwave Engineering	3	
3	COSY330464	Communication Systems	3	
4	AWPR330964	Antennas and Propagation	3	
5	WCSY431364	Wireless Communication Systems	3	
6	DICD436264	Digital Integrated Circuits Design	3	
7	LDSP412564	Digital Signal Processing Lab	1	
8	COSL420764	Communication Systems Lab	2	
9	WCSL422664	Wireless Communication Systems Lab	2	
10	PRTE411464	Project 1	1	
11	PRTE411664	Project 2	1	
II	*Elective courses*		*9*	
1	MOCO431864	Mobile Communication	3	
2	MICI431964	Microwave Circuits	3	
3	FOCO432064	Optical Communication	3	
4	INTH422164	Information Theory	2	
5	DICO432264	Digital Communication	3	
6	IMPR432463	Image Processing	3	
7	AUVI321563	Audio and Video Engineering	2	
8	TETM423164	Advanced Topics in Communication	2	
9	ITFA436064	Internet of Things: Foundations and Applications	3	
10	AICD433164	Analog Integrated Circuit Design	3	
11	CONE337764	Computer and Communication Networks	3	
C.2	***Industrial Electronics Area***			
I	*Compulsory Courses*		*24*	
1	POEL330262	Power Electronics	*3*	
2	ACSY330346	Automatic Control Systems	*3*	
3	ELEQ220944	Electrical Equipment	*2*	
4	PLCS330846	Programmable Logic Controller	3	

5	ELPS330345	Electrical Power System	3	
6	IMPR432463	Image Processing	3	
7	ELPR210644	Electric Lab	1	
8	POEP320262	Power Electronics Lab	2	
9	PPLC321346	Programmable Logic Controller Lab	2	
10	ELPR310863	Project 1	1	
11	ELPR310963	Project 2	1	
II	*Elective courses*		*9*	
1	SCDA420946	SCADA Systems	2	
2	RFID321363	RFID Technology	2	
3	ADMI320763	Advanced Microprocessor	3	
4	INCO321546	Intelligent Control	2	
5	IDMA322245	Industry Management	2	
6	NANO321463	Nano Technology	2	
7	PLCN422946	Industrial Communication Network	2	
8	NETT321263	Research in Modern Electronics Technology	2	
9	ELDA323245	Electric Drive and Application	2	
10	AUVI321563	Audio and Video Engineering	2	
11	MALE331063	Machine Learning	3	
12	BISI331863	Bio-Signal and -Image Processing	3	
13	SETE331963	Sensor Technology	3	
D	**Internship and Thesis**		12	
D.1	**Integrated-Circuits and Communications Electives**			
1	GRPR423064	Internship	2	
2	GRPR403264	Thesis	10	
D.2	**Industrial Electronics Area**			
1	GRPR324463	Internship	2	
2	GRAD401663	Thesis	10	

6- Teaching plan

1st Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	CPRL130064	C program language	3	
2	ENGL130137	English 1	3	
3	MATH130101	Advanced Mathematics 1	3	
4	MATH130201	Advanced Mathematics 2	3	
5	PHYS130102	General Physics A1	3	
6	INMA133164	Introduction to ECET	3	
7	PHED110513	Physical education 1	0	
8	LLCT150105	Fundamental principles Marxism – Leninism	5	
	Total		**23**	

2nd Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	ENGL230237	English 2	3	
2	MATH130301	Advanced Mathematics 3	3	MATH130101
3	MATH121201	Complex variable functions & Laplace transforms	2	MATH130101
4	MATH130401	Applied statistics probability	3	MATH130101
5	PHYS120202	General Physics A2	2	
6	PHYS110302	Physics experiment	1	PHYS130102
7	PHED110613	Physical education 2	0	
8	ELCI140144	Electric circuit	4	MATH130101
9	GCHE130103	General Chemistry A1	3	
	Total		**21**	

3rd Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	ENGL330337	English 3	3	
2	ELSA320245	Electrical Safety	2	ELCI140144
3	LLCT120314	Ho Chi Minh's ideology	2	
4	SISY330164	Signals and Systems	3	MATH130101
5	BAEL340662	Basic Electronics	4	ELCI140144
6	EMIN330244	Electrical measurement and instruments	3	ELCI140144
7	PHED130715	Physical education 3	0	
	Integrated-Circuits And Communications Area			
8	ELFI220344	Electromagnetic Field	2	MATH130101
	Industrial Electronics Area			
8	ELEQ220944	Electrical Equipment	2	ELCI140144
	Total		**19**	

4th Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	DIGI330163	Digital Systems	3	BAEL340662
2	DACO430664	Data Communication	3	SISY330164
3	DSPR431264	Digital Signal Processing	3	SISY330164

4	ELPR320762	Electronics Lab	2	BAEL340662
5	PMEM310844	Measurement Engineering Lab	1	EMIN330244
	Integrated-Circuits And Communications Area			
6	MIEN330364	Microwave Engineering	3	ELFI220344
	Industrial Electronics Area			
6	ELPS330345	Electrical Power System	3	ELEQ220944
	Free Electives (4 Credits)			
7	TDTS320805	Technical Writing	2	
8	PLSK320605	Planning Skills	2	
9	INLO220405	Introduction to Logic	2	
10	PRSK320705	Presentation Skills	2	
11	SYTH220505	System Thinking	2	
12	ULTE121105	University Learning Method	2	
	Total		**19**	

5th Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	MICR330363	Microprocessor	3	DIGI330163
2	DSIC330563	Digital Systems Design with HDLs	3	DIGI330163
3	PRDI320263	Digital Systems Lab	2	DIGI330163
4	LDAT411164	Data Communication Lab	1	DACO430664
5	GELA220405	General law	2	
	Integrated-Circuits And Communications Area			
6	AWPR330964	Antennas and Propagation	3	ELFI220344
7	COSY330464	Communication Systems	3	BMIE330364
8	LDSP412564	Digital Signal Processing Lab	1	DSPR431264
	Industrial Electronics Area			
6	POEL330262	Power Electronics	3	BAEL340662
7	ACSY330346	Automatic Control Systems	3	MATH121201
8	ELPR210644	Electric Lab	1	ELPS330345
	Free Electives (2 Credits)			
9	GEEC220105	General Economics	2	
10	INSO321005	Introduction to Sociology	2	
11	IQMA220205	Introduction to Quality Management	2	
12	INMA220305	Introduction to Management	2	
13	IVNC320905	Vietnamese Culture	2	
	Total		**20**	

6th Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	EMSY437764	Embedded Systems	3	MICR330363
2	COEL330264	Communication Electronics	3	BAEL340662
3	PRMI320463	Microprocessor Lab	2	MICR330363
4	PRDS320663	Digital Systems Design with HDLs Lab	2	DSIC330563
5	LLCT230214	VN Communist Party Policy of Revolution	3	
	Integrated-Circuits And Communications Area			
6	WCSY431364	Wireless Communication Systems	3	TESY330464
7	COSL420764	Communication Systems Lab	2	TESY330464

8	PRTE411464	Project 1	1	
	Industrial Electronics Area			
6	PLCS330846	Programmable Logic Controller	3	MICR330363
7	POEP320262	Power Electronics Lab	2	POEL330262
8	ELPR310863	Project 1	1	
	Total		**19**	

7th Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
1	ESPR427064	Embedded Systems Lab	2	EMSY437764
	Integrated-Circuits And Communications Area			DSIC330563
2	DICD436264	Digital Integrated Circuits Design	3	DSIC330563
3	WCSL422664	Wireless Communication Systems Lab	2	TESY431364
4	PRTE411664	Project 2	1	
	Integrated-Circuits And Communications Electives (9 Credits)			
5	MOCO431864	Mobile Communication	3	TESY431364
6	MICI421964	Microwave Circuits	2	BMIE3303644
7	FOCO432064	Optical Communication	3	TESY330464
8	INTH422164	Information Theory	2	TESY330464
9	DICO432264	Digital Communication	3	TESY330464
10	IMPR432463	Image Processing	3	SISY330164
11	AUVI321563	Audio And Video Engineering	2	TESY431364
12	TETM423164	Advanced Topics In Communication	2	DACO430664
13	ITFA436064	Internet of Things: Foundations and Applications	3	BAEL340662
14	AICD433164	Analog Integrated Circuit Design	3	SISY330164
15	CONE337764	Computer and Communication Networks	3	DACO43066
	Industrial Electronics Area			
2	IMPR432463	Image Processing	3	SISY330164
3	PPLC321346	Programmable Logic Controller Lab	1	PLCS330846
4	ELPR310963	Project 2	1	
	Industrial Electronics Electives (9 Credits)		4	
5	SCDA420946	SCADA Systems	2	PLCS330846
6	RFID321363	RFID Technology	2	ELCI140144
7	SETE331963	Sensor Technology	2	BAEL340662
8	ADMI320763	Advanced Microprocessor	2	MICR330363
9	INCO321546	Intelligent Control	2	MICR330363
10	IDMA322245	Industry Management	2	ACSY330346
11	NANO321463	Nano Technology	2	
12	PLCN422946	Industrial Communication Network	2	BAEL340662
13	NETT321263	Research In Modern Electronics Technology	2	DACO43066
14	ELDA323245	Electric Drive And Application	2	
15	AUVI321563	Audio And Video Engineering	2	SISY330164
16	MALE331063	Machine Learning	2	IMPR432463
17	BISI331863	Bio-Signal And -Image Processing	2	IMPR432463
	Total		**17**	

8th Semester

No.	Course Prefix and Number	Course Title	Cr.	Pre-requisite
	Integrated-Circuits And Communications Electives			
1	GRPR423064	Internship	2	
2	GRPR403264	Thesis	10	
	Industrial Electronics Area			
1	GRPR324463	Internship	2	
2	GRAD401663	Thesis	10	
	Total		**12**	

7- Brief Course Description

[1] Introduction to ECET

Credit: 3

Distribution of learning time: ***4 (2/2/6)***
Prerequisites: None
*Summaries of course:*This course provides the learnerwith knowledg eof expected learning outcomes for Electrical & Electronics Engineering Technology, framework program and education programme of Electrical & Electronics Engineering Technology, roles, positions and missions of engineer in Electrical & Electronics Engineering Technology and training fields and technology have been and will be applied Electrical & Electronics Engineering Technology.

[2] Advanced Mathematics 1 **Credits: 3**

Distribution of learning time: ***3 (3/0/6)***
Prerequisites: None
Former subjects of condition: None
Summaries of course: This course helps students review the general and advanced mathematical knowledge:Cardinality of a set: rational numbers, real numbers, complex numbers. Limit: function, limit of a function, continuous function. Differential calculus: derivative, differential, Taylor-Maclaurin expansion, the survey on function, curve in polar coordinates. Calculus of single variable: volume fraction uncertainty, definite integrals, generalized integrals. Chain: Chain number, string functions, power series, Taylor-Maclaurin sequence, Fourier series, Fourier expansion, trigonometric series.

[3] Advanced Mathematics 2 **Credit: 3**

Distribution of learning time: ***3 (3/0/6)***
Prerequisites: None
Former subjects of condition: Advanced Mathematics 1
Summaries of course: This course provides the learnerwith contents: Matrix-determinant: the matrix, the form of matrix, inverse matrix, determinants, matrix classes. System of Linear Equations: linear systems, Cramer rule, Gauss method, homogeneous system. Space Vector: Space Vector, subspace, linear independence, linear dependence, basis, dimension, Euclidean space. Diagonal matrix-quadratic form: eigenvalues, eigenvectors, private space, diagonal matrix, quadratic form, canonical form, the surface level 2. Differential calculus of function of several variables: function of several variables, derivative, differential, extreme of function of several variables, calculus applications in geometry in space.

[4] Advanced Mathematics 3 **Credit: 3**

Distribution of learning time: ***3 (3/0/6)***
Prerequisites: None
Former subjects of condition: Advanced Mathematics 1
Summaries of course: This course provides the learner with contents: multiple integral: double integral, application for calculated area of flat domain, calculate the surface area, object volume, triple integrals, applications for the object volume. Line integral: lineintegral type one and applications,line integral type one and applications, Green formula, condition of line integral does not depend on integrating line. Surface integral: Integral surface type one, type two, the Ostrogratskiformula, vector field, flux and divergence, vector format of Ostrogratski formula, Stokes formula, circulation and vortex vector, vector format of Stokes formula.

[5] Applied Probability **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: None
Former subjects of condition: Advanced Mathematics 1 +2

Summaries of course: This course provides the learner with contents: the basic concepts of probability theory: Cam count, consortium, conformable, permutations, Newton's binomial, trials, events , probability, conditional probability. Random variables: random variables, probability distribution laws of random variables, characteristics of random variables: expectation, variance, Mod, Med. The probability distributions areusual to use: binomial distribution, Poisson distribution, normal distribution, Student distribution. Sample theory: crowd concept, random sample, statistics in sample, sampling method, sample characteristics, distribution of sample characteristics, how to calculate the pattern characteristic. Estimation theory: estimation concept, estimation of point, estimation of space. Statistical hypothesis testing: the fallacy of type I and II, the significance of accreditation, accreditation on average, the rate of testing, testing on the equality of 2 medium, 2 ratio, tests of independence.Correlation and regression: 2-dimensional random variables, correlation coefficient, correlation coefficient of samples, experimental correlation tables, experimental regression line.

[6] Complex Functions and Laplace Transforms **Credit: 2**

Distribution of learning time: ***2(2/0/4)***

Prerequisites: None

Former subjects of condition: Advanced Mathematics 1 +2

Summaries of course: This course provides the learnerwith contents: Complex numbers: a complex number, the form of representation of complex numbers, complex number calculations, complex plane, the concept of closegroup, open group, blocked group, ...in complex plane. Complex Function: The complex function, real and imaginary parts of a complex function, image transformations by the complex function, limit, continuity, the primary basic function. The derivative complex function: derivative complex function, geometric mean, Cauchy–Riemann conditions, functional analysis, the relationship between analytic functions and harmonic functions. Integral of complex function: line integral of complex function, Cauchy integral, higher order derivative of analytic function. Series of complex function: complex power series, Taylor series, chain Laurent series, unusual point of analytic function. Surplus theory and applications: definition and calculation of surplus, the surplus application to calculate line integral of complex function, the surplus application to integrate trigonometric functions, applications surplus to calculate generalized integrals. Laplace transform and applications: the original function, image function and Laplace transform, inverse Laplace transform, properties of the Laplace transform, apply the Laplace transform to solve differential equations, differential equations, some of integral equations.

[7] General Physics A1 **Credit: 3**

Distribution of learning time: ***3(2/1/4)***

Prerequisites: None

Former subjects of condition: None

*Summaries of course:*This course provides the learnerwith contents:the mechanics: point dynamics, the law of conservation, solid motion. Thermodynamics: kinetic molecular theory, principles of Thermo dynamics I, principles of Thermo dynamics II. Electricity and magnetism: electric field, magnetic, variability of electrical magnetic field.

[8] General Physics A2 **Credit: 3**

Distribution of learning time: ***3(2/1/4)***

Prerequisites: None

Former subjects of condition: None

*Summaries of course:*This course provides the learner with knowledge: Einstein's theory of relativity: special theory of relativity, general theory of relativity. Optics: wave optics and interference, diffraction of light, quantum optics and the photo voltaic phenomena, Compton. Quantum physics: de Broglie and Heisenberg hypothesis, Schrödinger equation and the motion of the particles, the quantization of physical quantities. The course is based on practices to help

learners have a more intuitive view of the phenomena has been learned in theory include exercises: theory of calculation errors, determine moment of inertia of the wheel and the bearing friction, determine acceleration of gravity by the physical pendulum, determine the ratio of the heat capacity of the gas molecules, survey RLC resonant circuit-measure RLC by electronic oscilloscope, survey diode and transistor characteristics, determine own electric charge by magnetron method, survey Laser diffraction through the flat gratings, determine wavelengths of laser, survey radiation heat-phenomenon Stefan-Boltzman law experience, survey the phenomenon of thermal radiation -root ofStefan- Boltzman law, survey external photo electric phenomenon - determinePlanckconstant.

[9] English 1 **Credit: 3**

Distribution of learning time: ***3(3/0/6)***

Prerequisites:

Summaries of course: This course is designed for semester I of the first academic year, to review all knowledge and language skills which students learned at the high schools. In addition, it also tends to raise students' communicative ability in English. The course's goal helps students improve listening skill & speaking skill which aren't appreciated highly at high schools. The course makes students be aware of the role of English for their future jobs and society. And, It creates the sense of initialtive in self-education & building strategy to learn English well.

[10] English 2 **Credit: 3**

Distribution of learning time: ***3(3/0/6)***

Prerequisites: English 1

Summaries of course: This course is designed for semester II of the first academic year, to upgrade English skills for students who completed Advanced English 1. After cousrse, the students can apply their language knowledge to read, to listen & to speak about simple contents in general communication such as family, univerisy, friend, hobby, study.... Moreover, through instructing students how to use the learning documents and English teaching websites; tests and teacher's evaluations in a class, the student's self education raises appreciatively.

[11] English 3 **Credit: 3**

Distribution of learning time: ***3(3/0/6)***

Prerequisites: English 2

Summaries of course: This course is designed for semester I of the second academic year, to upgrade English competence for students who completed Advanced English 2. After course, students can read, listen to and speak in general situations well. They can represents something before class or give questions and argue about life, family, study... Besides, students are equipped knowledge & basic skills about TOEIC test to prepare the final test with the form as same as TOEIC. Ihe students are expected to get about TOEIC 400 atfer this course.

[12] Electrical Circuits **Credit: 4**

Distribution of learning time: ***4(4/0/8)***

Prerequisites: None

Former subjects of condition: Advanced Mathematics & General Physics

Summaries of course: This course provides the learnerwith basic contents about circuit analysis, established circuit under impact sine, circuit analysis methods, circuit theorems, two port network, circuit analysis in time-domain, circuit analysis in the frequency domain, draw the frequency characteristics of the transfer function.

[13] Basic Electronics **Credit: 4**

Distribution of learning time: ***4 (4/0/8)***

Prerequisites: Advanced Mathematics 3 & General Physics

Former subjects of condition: Electrical Circuits& General Physics

Summaries of course: This course provides the learnerwith knowledgeof electronic components, presentethe structureandprinciplesof operation oftheelectronic components, analyze and explain the principle of operation of simple electronic circuits, analyze the frequency response of the amplifier circuit, analyze and design the audio power amplifier circuits, distinguish the type of feedback, analyze and design application circuits used op-amp, analyze the principle of operation of the oscillator circuits, analyze and design the simple DC sources provide electronic circuits.

[14] Digital Systems **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Basic Electronics
Former subjects of condition: Electrical Circuits& General Physics
Summaries of course: This course provides the learnerwith knowledge of digital systems, the basic logic gate, the fundamental theorem of Boolean algebra, the combinational circuits, sequential circuit, operational structures of the basics of digital integrated circuits TTL and CMOS, characteristic parameters of digital integrated circuits, classify integrated circuits, the principle of changing between analog and digital signals, operational structure and application of the memory, the principles of the digital oscillator circuit.

[15] Electrical Measurement and Instruments **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Electrical Circuits
*Former subjects of condition:*Electrical Circuits, Basic Electronics
Summaries of course: This course provides the learnerwith knowledge of concept of measurement and electrical measure, understand the principles of structure and operations of the directive devices, known about measurement of electrical quantities structure, the method of measuring the electrical quantities such as current, voltage, resistance, capacitance, inductance, frequency, phase angle, power, analyse and estimate measurement errors, understand the principles and operation of the electrical measurement system in industry.

[16] Microprocessor **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Digital System
*Former subjects of condition:*Digital System, Basic Electronics.
Summaries of course: This course provides the learnerwith knowledgeof the role and functions of the processor, the processor system; historical development of processor generations, the basic parameters to assess the ability of the processor; the structure and role of the components in the block diagram of 8-bit microprocessors, principles of operation of 8-bit microprocessors; historical development of microcontrollers, advantages and disadvantages when using microcontrollers, internal and external structure of 8-bit microcontroller; function of peripheral devices: timer/counter, interrupts, data transfer of microcontroller, Assembly language, C language to programme the microcontroller.

[17] Electrical Safety **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites: None
Former subjects of condition: Electrical Circuits, Electrical Measurement and Instruments.
Summaries of course: This course provides the learnerwith knowledgeof basicconceptsof electrical safety, operatingmethodsfor electrical equipmentandelectricalnetworks are safety, measures to prevent dangerous electric shock, measures to avoid directand spread lightning, grounding measures, help people when electrical accident.

[18] Electronics Lab **Credit: 2**

Distribution of learning time: ***2(0/6/4)***

Prerequisites: Basic Electronics
Former subjects of condition:
Summaries of course: in this course, learners perform contents in usage of instruments in electronics; recognition of basic electronic components such as R, L, C, diode, BJT, FET, Op-Amp; verification of basic application circuits of the electronic components between theory and reality, from which analysis of circuit operation in practice; Applying the practical application circuits, analyzing of operation of basic electronic circuit in practice.

[19] Measurement Engineering Lab **Credit: 1**
Distribution of learning time: ***1(0/3/2)***
Prerequisites: None
Former subjects of condition: Electronic Measurement and instrumentation
Summaries of course: This course helps students recognize the meter, the actual observed structure of the machine, perform commissioning, testing and adjustment of the machine. Perform measuring electrical quantities such as current, voltage, R - L - C, capacity, power, frequency and phase angle.

[20] Digital Systems Lab **Credit: 2**
Distribution of learning time: ***2(0/6/4)***
Prerequisites: Digital Systems
Former subjects of condition:
Summaries of course: This course instructs students how to use devices and practise digital electronic circuits on them such as logic gates, Flip-Flops, counters, shift registers, combinational and sequential circuits, memory, DAC, ADC. In addition, the students learn how to work in groups, use datasheets in English, write weekly reports and pre-preparation

[21] Microprocessor Lab **Credit: 2**
Distribution of learning time: ***2(0/6/4)***
Prerequisites: Microprocessor
Former subjects of condition:
Summaries of course: This course gives students hands-on programming the microcontroller used to control objects to display information such as LED, LED 7-segment, LCD, GLCD, matrix LED ; the input objects such as buttons, keyboard matrix, temperature sensors, distance measurement sensor, motion sensor ; communication devices such as standard I2C real-time clock, serial EEPROM memory, ADC/DAC; counting pulses use counter, timing control use timer ; step motor and DC motors control use PWM modulation.

[22] Signals and Systems **Credit: 3**
Distribution of learning time: ***3(3/0/6)***
Prerequisites:
Former subjects of condition:
Summaries of course: This course covers the fundamentals of signal and system analysis, focusing on representations of continuous-time signals (singularity functions, complex exponentials and geometrics, Fourier representations, Laplace transforms) and representations of linear, time-invariant systems (difference and differential equations, block diagrams, system functions, poles and zeros, convolution, impulse and step responses, frequency responses). Applications are drawn broadly from engineering and physics, including feedback and control, communications, and signal processing.

[23] Data communication **Credit: 3**
Distribution of learning time: ***3(3/0/6***
Prerequisites:
Former subjects of condition: Signals and Systems

Summaries of course: This course will explore the various types of the data communication systems, networks and their applications. Concept & terminologies like computer networks, layer architecture (OSI, TCP/IP), network hardware, network software, standardization, network medium, and IP addressing will be explored. The practical aspect will deal with building small to medium level networks including Cabling, Configuring TCP/IP, Peer to Peer networking, sharing resources.

[24] Digital Signal Processing **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites:
Former subjects of condition: Signals and Systems, C Programming Language.
Summaries of course: This course provides students the knowledge related to the sampling and reconstruction of signals; time domain analysis of DT signals and systems; Z-transformation; frequency domain analysis of DT signals and systems such as DTFS, DTFT, N-DFT, and FFT. In addition, applications of digital signal processing are also discussed.

[25] Communication Electronics **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites:
Former subjects of condition: Signals and Systems, Basic Electronics
Summaries of course: This course examines operation and signaling in communications systems with a strong emphasis on circuits; covers radio frequency systems (AM, FM, TV), modulation schemes; discusses both analog and digital/data communication systems.

[26] Digital Systems Design with HDLs **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites:Digital Systems
Former subjects of condition: Basic Electronics
Summaries of course: This course provides students the knowledge of some device technologies and how to apply the HDL to describe basic circuits in Digital Systems. The basic device technologies taught in this course include ASIC, FPGA, and PLD. The Very High Speed Hardware Description Language (VHDL) is applied to design combinational circuits, sequential circuits in digital systems. After acquired the basic structures of IC design in VHDL, the tasks are developed to the higher level by concentrating to the optimization of timing and resources in order to get the suitable required performance of the IC circuits. The two main optimization methods being provided to students are operating sharing and functionality sharing. Moreover, the Finite State Machine (FSM) model is provided to design large sequential digital systems using VHDL. Finally, students are able to use the simulation software supported by Xilinx and Altera co-operations to verify the functions of designed IC circuits.

[27] Embedded Systems **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites:
Former subjects of condition: C Programming Language, Microprocessor, Digital systems
Summaries of course: Specification, design, development, and test of embedded systems. Study and develop the major elements of an embedded system. Integrate these pieces into a complete working system in the laboratory.

[28] Data Communication Lab **Credit: 1**

Distribution of learning time: ***1(0/3/2)***
Prerequisites: Data Communication
Former subjects of condition: Data Communication

Summaries of course: This course provides the basic skills such as: cable - press technology; use software to simulate line - coding; ability to analyze, install, test in the data transmission line, the baseband through different media.

[29] Digital Systems Design With HDLs Lab **Credit: 2**

Distribution of learning time: ***2(0/6/4)***

Prerequisites: **Digital Systems Design With HDLs**

Former subjects of condition: Basic electronics, Electrical safety.

Summaries of course: This course instruct students the whole process of combinational and sequential circuit designs using VHDL. The students firstly design digital IC systems in VHDL hardware description languages on EDA software supported by Xilinx and Altera. Finally, the functions of the designed digital systems are verified by simulation software before being tested on FPGA platforms.

[30] Embedded Systems Lab **Credit: 2**

Distribution of learning time: ***1(0/6/4)***

Prerequisites: Embedded Systems

Former subjects of condition: Basic electronics, Electrical safety

Summaries of course: This course provides sufficient detailed knowledge and hands-on laboratory experience for designing a simple system with Arm Cortex microcontroller. Many of the skills learned during the course lays the foundation to build complex systems in future. It is accomplished by a sequence of assigned labs, followed by a final project, emphasizing creativity and uniqueness.

[31] Electromagnetic Field **Credit: 2**

Distribution of learning time: ***2(2/0/4)***

Prerequisites: None

Former subjects of condition: Advanced Mathematics, General Physics.

Summaries of course: This course provides students the knowledge and basic equations in relation to Electromagnetic Theory (Electrostatic and Magneto static Field, Stationary Electromagnetism, Varying Electromagnetism), Calculation methods on electrical quantities of coaxial cylindrical cable, Concepts on electromagnetic wave and wave radiation in space, hollow rectangular waveguides and cavity resonators.

[32] Microwave Engineering **Credit: 3**

Distribution of learning time: ***3(3/0/6)***

Prerequisites: Electromagnetic Field

Former subjects of condition:

Summaries of course: Initial topics include transmission line equations, reflection coefficient, VSWR, return loss, and insertion loss. Examples include impedance matching networks using lumped elements, single-section and multi-section quarter wave transformers, single-stub and double-stub tuners, the design of directional couplers, and hybrids.

[33] Communication systems **Credit: 3**

Distribution of learning time: ***3(3/0/6)***

Prerequisites: Signals and Systems

Former subjects of condition:

Summaries of course: This course introduces basic principles and concept to design modern digital communication systems, including major components of a communication system, various communication channel models, basic transmitter and receiver designs (baseband signal, band-pass signal, Q-signal, I-signal, modulation/demodulation process), various digital modulation techniques (PAM, PSK, QAM, FSK, NRZ, CPM, GMSK), optimum detection and error probability analysis for various modulation schemes, non-coherent detector), carrier and symbol

synchronization (carrier phase and symbol timing recovery), channel capacity and channel encoding/decoding (error-correction codes, basic linear block codes, convolutional codes, TCM, Viterbi decoding algorithm).

[34] Antennas and propagation **Credit: 3**

Distribution of learning time: 3/0/6
Prerequisites: Microwave Engineering
Former subjects of condition:
Summaries of course: The course deals with analysis and design of antennas and their application to specific wireless systems. This course begins with an overview of the fundamental electromagnetic principles underlying wave propagation and antennas. The following topics include base station and handset antennas; antenna parameters: power pattern, directivity, effective aperture, radiation resistance, antenna impedance; antenna arrays; frequency independent antennas, log-periodic, and spiral antennas; micro-strip antennas; horn and satellite antennas.

[35] Wireless communication systems **Credit: 3**

Distribution of learning time: 3/0/6
Prerequisites: Communication Systems
Former subjects of condition: Signals and Systems, Data communication
Summaries of course: This course provides students the knowledge of advanced wireless communication systems. Content of course: diversity techniques; MIMO; OFDM; satellite and microwave transmission systems; principle, fundamental parts, operation of mobile communication systems such as GSM, WCDMA and LTE; technical solutions for the 5^{th} mobile system, as well as advanced solutions in wireless communication and some typical applications of wireless network. Tools and Mathematical models are used to help students understand operation methods of communication systems and know how to evaluate performance of a communication system.

[36] Digital Integrated Circuits Design **Credit: 3**

Distribution of learning time: 3/0/6
Prerequisites: Digital Systems Design With HDLs
Former subjects of condition: Digital Systems.
Summaries of course: Device fundamentals of CMOS field effect transistors and Bi-CMOS bipolar transistors. Reviews silicon materials properties, basic physics of p-n junctions and MOS capacitors, and fundamental principles of MOSFET and bipolar transistors. Design and optimization of MOSFET and bipolar devices. Fabrication technology for microelectronic devices: crystal growth, wafer fabrication and characterization, mask fabrication, photo-resist chemistry and physical properties, photo, e-beam and x-ray-lithography, diffusion doping, ion implantation, etching, CVD, MBE, DC and RF plasma reactors, evaluation and packaging. Operation of microelectronic devices, micro-optical devices, micro electromechanical devices.

[37] Digital Signal Processing Lab **Credit: 1**

Distribution of learning time: ***1(0/3/2)***
Prerequisites: Digital Signal Processing
Former subjects of condition:
Summaries of course: This course provides students with the skills to use Matlab software to simulate continuous-time (CT) signals and discrete-time (DT) signals. Through the simulating the types of signal, students can analyze, design and evaluate the CT and DT systems in both time and frequency domain. In addition, students are also involved in the analysis and evaluation of DT systems on Texas Instruments DSPs dedicated kit such as C6713 DSK, C6416 DSK and C6437 EVM.

[38] Communication Systems Lab **Credit: 2**

Distribution of learning time: ***2(0/6/4)***
Prerequisites: Communication Systems
Former subjects of condition:
Summaries of course: This course provides the basic skills such as: analyzing, measuring, explaining and repairing analog modulation circuits (AM, FM), digital modulation circuits (ASK, FSK, PSK …), pulse modulation circuits (PAM, PWM, PPM …), multiplexing circuits (TDM, FDM) and other practical circuits.

[39] Wireless Communication Systems Lab **Credit: 2**

Distribution of learning time: ***2(0/6/4)***
Prerequisites: Wireless Communication Systems
Former subjects of condition:
Summaries of course: This course provides fundamental knowledge about transmission model of wireless communication, effect of fading and ISI to performance of communication wireless, multicarrier system, OFDMA, CDMA, MIMO and multiuser systems.

[40] Mobile communication **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Wireless Communication Systems
Former subjects of condition:
Summaries of course: This course provides fundamental knowledge in mobile communication (MC) system such as: Development history of MC system, transmission media, block diagram of MC system, cell plan in MC system, signaling processing between Presentation, and metrical network quality, architecture of GSM network elements..

[41] Microwave circuits **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Microwave Engineering
Former subjects of condition:
Summaries of course: This course provides students the knowledge of the microwave devices such as resistors, capacitors, inductors, diodes, BJTs, and MOSFETs. In addition, analysis and design of the matching circuits are used in many microwave circuits related to microwave amplifiers, oscillators, filters, power dividers and couplers.

[42] Optical communication **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites:Communication Systems
Former subjects of condition:
Summaries of course: This course is a survey on optical communications, and provides information on the propagation medium (the fiber), lasers and detectors, passive components, optical amplification, and telecommunication systems.

[43] Information Theory **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites: Communication Systems
Former subjects of condition:
Summaries of course: This course offers a broad introduction to information theory and its applications: Entropy and information; lossless data compression; communication in the presence of noise, channel capacity, and channel coding; lossy compression and rate-distortion theory.

[44] Digital communication **Credit: 3**

Distribution of learning time: ***3(3/0/6)***

Prerequisites:Communication Systems
Former subjects of condition:
Summaries of course: This course provides fundamental knowledge about transmitting and receiving of digital communication, and elements of a modern digital communication system. In which, the course focuses signal representations, modulation techniques, coherent and incoherent demodulations, performance analyzation and optimal receiver design. Some basic concepts of information theory, probability and random process are also presented in the course. Besides, the course will introduce topics about multi-carrier signal transmission, ISI, equalizer, channel coding using in digital communication systems.

[45] Image Processing **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites:Signals and Systems
Former subjects of condition:
Summaries of course: This course introduces fundamental knowledge of image processing. The concept includes basic operation on image domain and its applications. These issues about image fitering, image enhancement, segmentation and edge detection will be discussed

[46] Audio And Video Engineering **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites:Communication Systems
Former subjects of condition:
Summaries of course: This course provides students with the contents: Systems of audio and video signal processing, simulation of audio and video signal processing.

[47] Advanced Topics In Communication **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites:Wireless Communication Systems
Former subjects of condition:
Summaries of course: This course introduces selective topics in communication field being applied now. This course focuses to research overview and to analyze, evaluate technology and technical methods, as well as intensive theories of communication field. Commonly practical matters are also proposed as topic forms and being presented, discussed in the class. Detail content of this course can be changed according to selecting specialize topics. These topics can include overview introduction of communication networks, details about Public Switched Telephone Network (PSTN), principle of WCDMA system being used, SDH HiT 7070 transmission, NGN, radio optimization, power system, KPI, MPLS, … Last, the results about overview analyzation and evaluation will be included in research topics that are suitable for students.

[48] Internet of Things: Foundations and Applications **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
*Prerequisites:*Embedded Systems
Former subjects of condition:
Summaries of course: The main aim of this course is to introduce the fundamental concepts of the Internet of Things and its applications and architecture models; the technologies and mechanisms for sensing, actuation, processing and cyber-physical data communication; Discussing semantic technologies, service oriented solutions and networking technologies that enable the integration of IoTs data and services into the cyber world.

[49] Analog Integrated Circuit Design **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Digital Systems Design with HDLs
Former subjects of condition:

Summaries of course: This course focuses on analog integrated circuit design in the CMOS technology for various applications such as communications, sensors, instruments, data converters, and PLLs. Topics covered include bipolar and MOS devices and models, amplifiers, current mirrors, frequency responses, operational amplifiers; and band-gap references. The course involves full custom circuit design using industry CAD software.

[50] Computer and Communication Networks **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Data Communications
Former subjects of condition:
Summaries of course: Introduction to analysis and design of computer and communication networks through understanding the network layered architecture and the protocol stack and by conducting hands-on programming and lab activities.

[51] Power Electronics **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: None
Former subjects of condition: Electric Circuits; Basic Electronics; Electric Machines.

Summaries of course: This course provides the learnerwith knowledge of basic power electronic accessories, specialized. The structure, operating principles, waveform and parameters: the uncontrolled and controller rectifiercircuits; modified circuit, switching voltage AC, transform DC voltage, invert and select the DC power supply.

[52] Automatic Control Systems **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: None
Former subjects of condition: Electrical Circuits, Complex Functions and Laplace Transforms.
Summaries of course: This course provides the learnerwith knowledge of the components of an automatic control system, the method of building mathematical models of the automatic control system including: transfer function, signal graph and equation of state, the problem of control and observation, the stable survey methods of automatic control systems: survey methods of quality of control system: accuracy, time domain, frequency domain and the design methods of automatic control system so that the stable system and achieve quality targets.

[53] Electrical Equipment **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites: None
Former subjects of condition: This course provides students the knowledge of the electrical equipment in the industry, including the structure, working principles, the working mode, the application of various types of industrial electrical equipment.

[54] Programmable Logic Controller **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Automatic Control Systems
Former subjects of condition: None
Summaries of course: This course equips learner's contents of the method for determining the output of the sensors, how to calculate the value of output as required, the type of sensor connection and actuators with controllers PLC, functional and operational principles of PLC and application scripts.

[55] Electrical Power System **Credit: 3**

Distribution of learning time: ***3(3/0/6)***

Prerequisites: Electric Circuits
Former subjects of condition: None
Summaries of course: This course equips learner's contents of the method for determining the load calculation, calculate voltage loss, power loss, and short circuit calculations, select the number and transformer capacity, diagrams distribution substations and redundant power. Function and operating principle of the switchgear, medium and low voltage protection, the method selected conductors, cables, switchgear protect- sectioning measurement, distribution cabinet low and medium voltage, offset low voltage network power plant and industrial lighting calculations.

[56] Electrical Lab **Credit: 1**
Distribution of learning time: ***1(0/3/2)***
*Prerequisites:*Electrical Safety, Electrical Circuit
Former subjects of condition: None
Summaries of course: learners perform contents in basic electrical installation technology, calculation method for constructing and installing; quality inspection, electrical machine installation technology and operating common electrical machines.

[57] Power Electronics Lab **Credit: 2**
Distribution of learning time: ***2(0/6/4)***
Prerequisites: Basic Electronics
Former subjects of condition: Electrical Safety.
Summaries of course: This course provides learners knowledge about installation of circuits, operatiion of circuits, waveforms of circuits, DC-DC converter, DC-AC converter, AC-DC converter, IGBT. The learners are able to regconise and to repair faults in power electronics system, and to design PWM circuits.

[58] Programmable Logic Controller Lab **Credit: 2**
Distribution of learning time: ***2(0/6/4)***
*Prerequisites:*Programmable Logic Controller
Former subjects of condition: basic computer, Digital System, Automatic Control Systems, Programmable Logic Controller.
Summaries of course: This course provides learnerswide knowlegde about sensors conecting to controllers; the learners are able to design, choose programmable equiment and program for demanding industrial systems.

[59] SCADA Systems **Credit: 2**
Distribution of learning time: ***2(2/0/4)***
Prerequisites: None
Former subjects of condition: Power Supply System, Power System.
Summaries of course: This course provides knowledge of: components of SCADAin automatic system; actuator system; input/output remote terminal units RTU orProgrammale Logic ControllersPLC, center monitor and control station; communication system; Human- Machine Interface HMI; hardware and software integrated method tobuild a SCADA system in practice.

[60] RFID Technology **Credit: 2**
Distribution of learning time: ***2(2/0/4)***
Prerequisites: None
Former subjects of condition:
Summaries of course: This course provides the analysis and design of RFID technologies for automatic identification including the theory of operation, analysis of RFID system components, passive and active tags, frequencies used, air interfaces, coding structures, antenna design, and regulatory compliance.

[61] Advanced Microprocessor **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites: Microcontroller
Former subjects of condition:
Summaries of course: This course provides students the knowledge of the 32 bit ARM Cortex. Students will learn the structure and operation of ARN Cortex's peripherals from basic to advanced, so they can design the hardware and program the software the systems using ARM Cortex.

[62] Intelligent Control **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites: None
Former subjects of condition:
Summaries of course: The course provides an understanding of the functional operation of a variety of intelligent control techniques; the study of control-theoretic foundations; learning analytical approaches to study properties, and use of the computer for simulation and evaluation.

[63] Industrial Management **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites: Advanced Mathematics, General Economics.
Former subjects of condition: None
Summaries of course: This course equips learners for contents inrisk management, logistics management, planning skills of long-term and mid-term, planning and strategic management of company's production from earlier supply-demand and revenues.

[64] Nano Technology **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites: General Physics.
Former subjects of condition: None
Summaries of course: The course provides the description of the basic physical phenomena at nano-scale; nanoelectronics; new types of quantum electronic devices; molecular nanotechnology, characterization of nanomaterials, the tools of fabrication and manipulation; properties and applications of nanomaterials.

[65] Industrial Communication Network **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites:Data Communications
Former subjects of condition: None
Summaries of course: The course provides an understanding of the OSI model in the context of industrial communication protocols; Standard serial interfaces; Protocols dedicated to utilities applications; Industrial protocols; Industrial wireless; Industrial Ethernet; SCADA and OPC.

[66] Research In Modern Electronics Technology **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites:
Former subjects of condition: None
Summaries of course: This course provides students the knowledge of application programming in Android Operating System. Students will learn the history of the mobile operating system, the mobile programming trends, capabilities of the open source. In addition, the course introduces students to Android developer tools, basic structure of a project, user interface, control objects, event handling, and debugging an applition. Using application classes of SMS, bluetooth, wifi, acceleration sensor, voice recognition to design electronics systems

[67] Electric Drive And Application **Credit: 2**

Distribution of learning time: ***2(2/0/4)***
Prerequisites:Electric Circuits, Electric Machines
Former subjects of condition: None
Summaries of course: This course provides an understanding of the fields of electric drive and applications such as electric machine theory, power electronics, analog and digital control theory, real-time application of digital controllers, mechanical system modeling and interaction with electric power systems.

[68] Machine Learning **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: C programming language
Former subjects of condition: None
Summaries of course: This course provides students fundamental knowledge about pattern recognition and machine learning. This course introduces fundamental supervised and unsupervised learning algorithm as well as recommendation system.

[69] Bio-Signal And -Image Processing **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Digital Image Processing, Programming Languages
Former subjects of condition: None
Summaries of course: This course provides for students the knowledge of bio-signal and –image processing, such as EEG, EMG, fNIRS, CT-Scanner and MRI. This course also instructs students from the basic knowledge about bio-signals and bio-images to the operators related to the processing of bio-signals and bio-images. These operators include transformations, filtering, feature extractions, and neuron networks.

[70] Sensor Technology **Credit: 3**

Distribution of learning time: ***3(3/0/6)***
Prerequisites: Signals and Systems
Former subjects of condition: None
Summaries of course: The use of many types of sensors rapidly increases in the modern technology. Currently a lot of applications related to sensors found in many different fields such as environmental technology, fabrication techniques, industrial automation and biomedical technology. Course content focuses on the theoretical basis, working principles and application of the sensors. This course also refers to the technique of measurement, sensor signal processing and sensor measurement systems.

8- Curriculum Design Guide

Mapping of ELOs to PEOs:

PLOs \ ELOs		Student Expected Learning Outcomes										
		ELO-01	ELO-02	ELO-03	ELO-04	ELO-05	ELO-06	ELO-07	ELO-08	ELO-09	ELO-10	ELO-11
Programme Education Objectives	PEO-01	**x**	**x**	**x**								
	PEO-02				**x**	**x**	**x**	**x**				
	PEO-03								**x**	**x**		
	PEO-04										**x**	**x**

Mapping of courses and activities to program outcomes

Type	Code	Subject name	Student Expected Learning Outcomes										
			1	2	3	4	5	6	7	8	9	10	11
General knowledge													
Compulsory Courses													
LEC	LLCT	Basic Principles of Marxist-									H		
LEC	LLCT	Ho Chi Minh's Theory									H		
LEC	LLCT	VN Communist Party Policy of									H		
LEC	GEL	General Law								H	H		
OTH	CPRL	C Programming Language	H	M	H				M				
LEC	ENG	English 1					H						
LEC	ENG	English 2					H						
LEC	ENG	English 3					H						
LEC	MAT	Advanced Mathematics 1	H										
LEC	MAT	Advanced Mathematics 2	H										
LEC	MAT	Advanced Mathematics 3	H										
LEC	MAT	Applied Statistics Probability	H										
LEC	PHYS	General Physics A1	H										
LEC	PHYS	General Physics A2	H										
LAB	PHYS	Physics Experiment	M									H	
LEC	MAT	Complex Variables and Laplace	H										
LEC	GCH	General Chemistry A1	H										
Free electives													
LEC	GEEC	General Economics									H		
LEC	PLSK	Planning Skill							H				
LEC	INM	Introduction to Management									H		
LEC	INSO	Introduction to Sociology									H		
LEC	IQM	Introduction to Quality Management									H		
LEC	INLO	Introduction to Logic							H				
LEC	PRSK	Presentation Skills				H							
LEC	SYTH	Systems Thinking		H									
LEC	ULTE	University Learning Method							H				
LEC	IVNC	Vietnamese Culture									H		
LEC	TDTS	Technical Writing				H							
Electrical and Electronics Core													

OTH	INM	Introduction to ECET	M	M	M	M		M	M			L	L
LEC	ELCI	Electric Circuit	H	H	L				H				
LEC	BAEL	Basic Electronics	H	H			M		H				
LEC	DIGI3	Digital Systems	H	H			M		H				
LEC	EMIN 33024	Electrical measurement and instruments	H	M					M			M	
LEC	MICR	Microprocessor	H	H			M		H				
LEC	ELSA	Electrical Safety	H	M			L		H				
LAB	ELPR	Electronics Lab	H	H			M		H				
LAB	PME	Measurement Engineering Lab	H		H		M		L				M
LAB	PRDI	Digital Systems Lab	H	H	H		M		L				H
LAB	PRMI	Microprocessor Lab	M	H	H		L		M				H
Electrical and Electronics Advanced Core													
LEC	SISY	Signals and Systems	H	M	L				M				
LEC	COEL	Communication Electronics	H	M					M				
LEC	DAC	Data communication	H	M					M				
LEC	DSPR	Digital Signal Processing	H	H	M				M				L
DES	DSIC	Digital Systems Design w/HDL	H	M			M		M				
LEC	EMS	Embedded Systems	H	M	H				M				M
LAB	LDA	Data Communication Lab	M	M	H			H	M	H	L	H	M
LAB	PRDS	Digital System Design with HDLs	M	H	H		M		M				H
LAB	ESPR	Embedded Systems Lab	M	M	H			H	M	H	L	H	M
Integrated-Circuits and Communications Area													
Compulsory Courses													
LEC	ELFI2	Electromagnetic Field	H						M				
LEC	MIEN	Microwave Engineering	H	M					M				
LEC	COS	Communication Systems	H	M	L				M				
LEC	AWP	Antennas and Propagation	H	M	L				M				M
LEC	WCS	Wireless Communication Systems	H	M	M				M				M
LEC	DICD	Digital Integrated Circuits Design	H	M	M				M			L	H
LAB	LDSP	Digital Signal Processing Lab	M	M	H	M	M	H	M	H	L	H	M
LAB	COSL	Communication Systems Lab	M	M	H	M	M	H	M	H	L	H	M
LAB	WCS	Wireless Communication Systems	M	M	H	M	M	H	M	H	L	H	M
OTH	PRTE	Project 1	H	H	H	H	M	H	H	H	M	H	H

OTH	PRTE	Project 2	H	H	H	H	M	H	H	H	H	H	H
Elective Courses														
LEC	MOC	Mobile Communication	H	M	M				M			L	H
LEC	MICI	Microwave Circuits	H	M	M				M			L	H
LEC	FOC	Optical Communication	H	M	M				M			L	H
LEC	INTH	Information Theory	H	M	H				M			L	H
LEC	DICO	Digital Communication	H	M	M				M			L	H
LEC	IMPR	Image Processing	H	M	M				M			L	H
LEC	AUVI	Audio and Video Engineering	H	M	M				M			L	H
LEC	TET	Advanced Topics in Communication	H	M	M				M			L	H
LEC	ITFA	IoTs: Foundations and Applications	H	M	M				M			L	H
LEC	AICD	Analog Integrated Circuit Design	H	M	M				M			L	H
DES	CON	Computer and Communication	H	M	M				M			L	H
Industrial Electronics Area Core														
Compulsory Courses														
LEC	POEL	Power Electronics	H	H			M		H				
LEC	ACS	Automatic Control Systems	H	H			L		L				
LEC	ELEQ	Electrical Equipment	H	H			M		H				
LEC	PLCS	Programmable Logic Controller	H	H			M	M	H				
LEC	ELPS	Electrical power supply	H	H			L		M				
LEC	IMPR	Image Processing	H	H			M	M	H				
LAB	ELPR	Electric Lab	H	H	H				M	L			
LAB	POEP	Power Electronics Lab	M	H	H		L						H
LAB	PPLC	Programmable Logic Controller Lab	M	H	H		M						H
OTH	ELPR	Project 1	H	H	H	H	M	H	H	H	M	H	H
OTH	ELPR	Project 2	H	H	H	H	M	H	H	H	H	H	H
Elective Courses														
LEC	RFID	RFID Technology	H	M	M				M			L	H
LEC	ADM	Advanced Microprocessor	H	M	M				M			L	H
LEC	INCO	Intelligent control	H	M	M				M			L	H
LEC	SCD	SCADA System	H	M				H	M				H
LEC	IDM	Industry management	H	M	M				M			L	H
LEC	NAN	Nano Technology	H	M	M				M			L	H
LEC	PLCN	Industrial Communication Network	H	M	M				M			L	H

LEC	NETT	Research in Modern Electronics	H	M	M				M			L	H
LEC	ELD	Electric Drive and Application	H	M	M				M			L	H
LEC	AUVI	Audio and Video Engineering	H	M	M				M			L	H
LEC	MAL	Machine Learning	H	M	M				M			L	H
LEC	BISI3	Bio-Signal and -Image Processing	H	M	M				M			L	H
LEC	SETE	Sensor Technology	H	M	M				M			L	H
Thesis													
OTH	GRPR	Internship (ICET)	M	L	H	H	H	H	H	H	H	H	L
OTH	GRPR	Thesis (ICET)	H	H	H	H	H	H	H	H	H	H	H
OTH	GRPR	Internship (IEET)	M	L	H	H	H	H	H	H	H	H	L
OTH	GRA	Thesis (IEET)	H	H	H	H	H	H	H	H	H	H	H
Number of courses contributing strongly to each programme outcome			**67**	**25**	**23**	**10**	**07**	**14**	**21**	**14**	**15**	**14**	**36**

Legen	**LEC -Lecture course**	**H- High contribution**
	LAB - Laboratory course	**M- Medium Contribution**
	DES - Design course	**L- Low contribution**
	OTH - Other	

ECET Curriculum Flow: