**MINISTRY OF EDUCATION & TRAINING**

**HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION**

**UNDERGRADUATE PROGRAM**

***Major of***

**ELECTRONICS AND COMMUNICATION ENGINEERING TECHNOLOGY**

**JANUARY – 2017**

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| THE MINISTRY OF EDUCATION & TRAINING**HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION** | SOCIALIST REPUBLIC OF VIETNAMIndependence – Liberty - Happiness |

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**UNDERGRADUATE PROGRAM**

**Program:** Electronics And Communication Engineering Technology

 **Level:** Undergraduate

**Major:** Electronics and communication engineering technology

**Type of Program**: Full time

 *(Decision No……date….on………)*

1. **Duration of Study:** 4 years
2. **Student Enrollment:** High-school Graduates
3. **Grading System, Curriculum and Graduation Requirements**

**Grading System:** 10

**Curriculum:** Based on regulations of Decision No 43/2007/BGDDT

**Graduation Requirements:**

*General condition***:** Based on regulations of Decision No 43/2007/BGDDT

*Condition of specialty***:** None

1. **The Goals, Objectives, and Expected Learning Outcomes**

**Goals:**

Training Engineers of Electronics and Communication Engineering Technology (ECET) major have basic science knowledge, basic and professional knowledge about electronics and communication, analytic capacities, solving problems and evaluating solutions, constructing abilities and managing electronics and communication systems, having abilities about communication and group work, profession attitudes which meet development requirements of field and society. Graduated students can work offices and organizations in electronics and communication fields, electronics-communication-applied units, training establishments in electronics and communication.

**Objectives:**

PO 1 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 (ELO-01, ELO-02, ELO-03)

PO 2 Communicate and work effectively in multidisciplinary teams and continue career-long professional development through engagement in lifelong learning (ELO-04, ELO-05, ELO-06, ELO-07)

PO 3 Fulfill the needs of society in solving technical problems using engineering principles, tools and practices, in an ethical and professional manner (ELO-08, ELO-09)

PO 4 Make technical contributions to design, development, and manufacturing in their practice of electronics and communication engineering technology (ELO-10, ELO-11)

**Expected Learning Outcomes:**

ELO 1 An ability to apply knowledge of mathematics, science, computer fundamentals, and engineering

ELO 2 An ability to identify, formulate and solve engineering problems and to design a system, component, or process to meet desired needs

ELO 3 An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

ELO 4 An ability to apply written, oral, and graphical communication in both technical and non-technical environments

ELO 5 An ability to communicate in English

ELO 6 An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting

ELO 7 A recognition of the need for continuous learning, and an ability to engage in life-long learning

ELO 8 An ability to understand the tenants of professional codes of ethics and to apply ethical considerations to realistic problems

ELO 9 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

1. **Blocks of knowledge in the whole program:**130 credits (without Physical Education and National Defense Education knowledge)
2. **Block of knowledge**

|  |  |
| --- | --- |
| **Groups of Courses** | **Credits** |
| **Total** | **Compulsion** | **Elective** |
| General Education | **40** | **36** | **4** |
| Philosophy, Politics and Law | 12 | 12 | 0 |
| Social Science | 4 | 0 | 4 |
| Mathematics and Natural Sciences | 21 | 21 | 0 |
| Introduction to ECET | 3 | 3 | 0 |
| **Electronics and Communication Engineering Technology** | **90** |  |  |
| Electronics and Communication Core | 29 | 23 | 06 |
| Electronics and Communication Advanced Core | 12 | 12 | 0 |
| Electronics and Communication Area Core | 14 | 14 | 0 |
| Free Electives | 6 | 0 | 6 |
| Practice and laboratory | 17 | 17 | 0 |
| Internship | 2 | 2 | 0 |
| Graduation Thesis | **10** | **10** | **0** |

1. **Program content**
2. ***General knowledge: 40 Credits***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Course Prefix****and Number** | **Course Title** | **Cr** | **Pre-Requisites** |
|  | LLCT150105E | Principles of Marxist-Leninism | 5 |  |
|  | LLCT120314E | Ho Chi Minh’s Ideology | 2 |  |
|  | LLCT230214E | Vietnamese Communist Party Policy of Revolution | 3 |  |
|  | GELA220405E | General Laws | 2 |  |
|  | MATH141601E | Calculus 1 | 4 |  |
|  | MATH141701E | Calculus 2 | 4 |  |
|  | MATH141801E | Calculus 3  | 4 |  |
|  | MATH122101E | Probability with Applications | 2 |  |
|  | PHYS 130402E | Principles of Physics 1 | 3 |  |
|  | PHYS110602E | Principles of Physics - Lab 1 | 1 |  |
|  | GCHE130603E | General Chemistry for Engineers | 3 |  |
|  | INMA133164E | Introduction to ECET | 3 |  |
|  |  | Humanities/Social Science Elective 1\*  | 2 |  |
|  |  | Humanities/Social Science Elective 2\* | 2 |  |
|  | PHED110513E | Physical Education 1 | 0 |  |
|  | PHED110613E | Physical Education 2 | 0 |  |
|  | PHED130715E | Physical Education 3  | 0 |  |
|  |  | National Defense Education | 0 |  |

***\*Humanities/Social Science Electives***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | GEEC220105E | General Economics | 2 |  |
|  | INMA220305E | Introduction to Management | 2 |  |
|  | INSO321005E | Introduction to Sociology | 2 |  |
|  | IQMA220205E | Introduction to Quality Management | 2 |  |
|  | INLO220405E | Introduction to Logics | 2 |  |
|  | SYTH220505E | Systems Thinking | 2 |  |
|  | IVNC320905E | Vietnamese Culture | 2 |  |

***Supplementary Courses***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | EHQT130137E | Academic English 1 | 3 |  |
|  | EHQT230237E | Academic English 2 | 3 |  |
|  | EHQT330337E | Academic English 3 | 3 |  |
|  | EHQT430437E | Academic English 4 | 3 |  |
|  | EHQT530537E | Academic English 5 | 3 |  |
|  | TEEN120145E | Technical English 1 | 2 |  |
|  | TEEN230245E | Technical English 2 | 3 |  |
|  | TEEN330345E | Technical English 3 | 3 |  |
|  | TEEN430445E | Technical English 4 | 3 |  |

1. ***Professional education knowledge: 90 credits***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Course Prefix****and Number** | **Course Title** | **Cr** | **Pre-Requisites** |
| **A.1** | **Electronics and Communication Core****38** | **23** |  |
| 1 | CPRL130064E | C programming language | 3 | x |
| 2 | AMEE331944E | Applied Mathematics for EEE | 3 |  |
| 3 | SISY330164E | Signals and Systems | 3 | x |
| 4 | ELCI140144E | Electric Circuits | 4 | x |
| 5 | BAEL340662E | Basic Electronics | 4 | x |
| 6 | DIGI330163E | Digital Systems | 3 | x |
| 7 | MICR330363E | Microprocessor | 3 | x |
| **A.2** | **Electronics and Communication Electives****38** | **6** |  |
| 1 | EMIN330244E | Electrical Measurement and Instruments | 3 | x |
| 2 | ACSY330346E | Automatic Control Systems | *3* | x |
| 3 | IMPR432463E | Image Processing | 3 | x |
| 4 | ELFI220344E | Electromagnetic Field | 2 | x |
| 5 | ELSA320245E | Electrical Safety | 2 | x |
| 6 | ELMA240344E | Electric Machines | 4 | x |
| **B** | **Electronics and Communication Advanced Core****13** | **12** |  |
| 1 | DSIC330563E | Digital Systems Design with HDLs | 3 | x |
| 2 | EMSY435664E | Embedded Systems | 3 | x |
| 3 | DSPR431264E | Digital Signal Processing | 3 | x |
| 4 | DACO430664E | Data communication | 3 | x |
| ***C.1*** | ***Integrated-Circuits And Communications (ICC) Area Core*** | ***14*** |  |
| 1 | COSY330464E | Communication Systems | 3 | x |
| 2 | MIEN330364E | Microwave Engineering | 3 | x |
| 3 | WCSY431364E | Wireless Communication Systems | 3 | x |
| 4 | DICD436264E | Digital Integrated Circuits Design | 3 |  |
| 5 | PRTE411464E | Senior Design Project 1Project II | 1 | x |
| 6 | PRTE411664E | Senior Design Project 2 | 1 | x |
| ***C.2*** | ***Industry Electronics System (IES) Area Core*** | ***14*** |  |
| 1 | POEL330262E | Power Electronics | *3* | x |
| 2 | SETE331963E | Sensors and System Interfacing | *3* | x |
| 3 | PLCS 330846E | Programmable Logic Controller | 3 | x |
| 4 | ELDR330545E | Automatic Electric Drive | 3 | x |
| 5 | ELPR310863E | Senior Design Project 1 | 1 | x |
| 6 | ELPR310963E | Senior Design Project 2 | 1 | x |
| **D** | **Electives** | **6** |  |
| 1. 1
 | MOCO431864E | Mobile Communication | 3 | x |
|  | MICI431964E | Microwave Circuits | 3 | x |
|  | FOCO432064E | Optical Communication  | 3 | x |
|  | DICO432264E | Digital Communication | 3 | x |
|  | AWPR330964E | Antenna and Wave Propagation | 3 |  |
|  | ITFA436064E | Internet of Things: Foundations and Applications | 3 | x |
|  | AICD433164E | Analog Integrated Circuit Design | 3 |  |
|  | CONE337764E | Computer and Communication Networks | 3 | x |
|  | TETM433164E | Advanced Topics In Communication | 3 | x |
|  | INTH422164E | Information Theory | 3 |  |
|  | SCDA420946E | Data acquisition system and SCADA | 2 | x |
|  | ELPS330345E | Electrical Power Supply | 3 | x |
|  | INCO321546E | Intelligent Control | 2 | x |
|  | AUVI321563E | Audio and Video Engineering | 2 | x |
|  | RFID321363E | RFID Technology | 2 |  |
|  | NETT321263 | Research In Modern Electronics Technology  | 2 | x |
|  | MALE331063 | Machine Learning | 3 | x |
|  | BISI331863 | Bio-Signal And -Image Processing | 3 | x |
| **E** | **Practice and laboratory** | **17** |  |
| 1 | ELPR210644E | Electric Lab | 1 | x |
| 2 | ELPR320762E | Basic Electronics Lab | 2 | x |
| 3 | PRDI320263E | Digital Systems Lab | 2 | x |
| 4 | PRMI320463E | Microprocessor Lab | 2 | x |
| 5 | LDAT411164E | Data Communication Lab | 1 | x |
| 6 | LDSP412564E | Digital Signal Processing Lab  | 1 | x |
| 7 | ESPR427064E | Embedded Systems Lab | 2 | x |
| 8 | PRDS320663E | Digital Systems Design with HDLs Lab | 2 | x |
| ***E.1*** | ***Integrated-Circuits And Communications ( ICC)*** |  |  |
| 1 | COSL420764E | Communication Systems Lab | 2 | x |
| 2 | WCSL422664E | Wireless Communication Systems Lab | 2 | x |
| ***E.2*** | ***Industry Electronics System (IES)*** |  |  |
| 1 | POEP320262E | Power Electronics Lab | 2 | x |
| 2 | PPLC321346E | Programmable Logic Controller Lab | 2 | x |
| **F** | **Internship and Thesis** | **12** |  |
| 1 | GRPR423064E | Internship (ICC) | 2 |  |
| 2 | GRPR433164E | Capstone Design Project 1 (ICC) | 3 |  |
| 3 | GRPR473264E | Capstone Design Project 2 (ICC) | 7 |  |
| 4 | GRPR324463E | Internship (IES) | 2 |  |
| 5 | GRAD431663E | Capstone Design Project 1 (IES) | 3 |  |
| 6 | GRAD471763E | Capstone Design Project 2 (IES) | 7 |  |

1. **Study Plan**

**Semester 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Cr** | **Prerequisite** |
|  | INMA133164E | Introduction to ECET | 3 |  |
|  | CPRL130064E | C program language | 3 |  |
|  | MATH141601E | Calculus 1 | 4 |  |
|  | PHYS 130402E | Principles of Physics 1 | 3 |  |
|  | MATH122101E | Probability with Applications | 2 |  |
|  | LLCT150105E | Principles of Marxist-Leninism | 5 |  |
|  | PHED110513 | Physical education 1 | 1\* |  |
|  | EHQT130137E | Academic English 1 | 3\* |  |
|  | EHQT230237E | Academic English 2 | 3\* |  |
|  | **Total** |  | **20** |  |

**Semester 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Cr**  | **Prerequisite** |
|  | MATH141701E | Calculus 2 | 4 |  |
|  | AMEE331944E | Applied Mathematics for EEE | 3 |  |
|  | GCHE130603E | General Chemistry for Engineers | 3 |  |
|  | PHYS110602E | Principles of Physics - Lab 1 | 1 |  |
|  | ELCI140144E | Electric circuit | 4 |  |
|  | SISY330164E | Signals and Systems | 3 |  |
|  | LLCT120314E | Ho Chi Minh’s Ideology | 2 |  |
|  | PHED110613 | Physical education 2 | 1\* |  |
|  | EHQT330337E | Academic English 3 | 3\* |  |
|  | EHQT430437E | Academic English 4 | 3\* |  |
|  | TEEN120145E | Technical English 1 | 2\* |  |
|  | **Total** |  | **20** |  |

**Semester 3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Credit**  | **Prerequisite** |
|  | MATH141801E | Calculus 3  | 4 |  |
|  | BAEL340662E | Basic Electronics | 4 |  |
|  | DIGI330163E | Digital Systems | 3 |  |
|  | ELPR210644E | Electric Practice | 1 |  |
|  |  | Technical Electives\* | 3 |  |
|  | PHED130715 | Physical education 3 | 3\* |  |
|  | EHQT530537E | Academic English 5 | 3\* |  |
|  | TEEN230245E | Technical English 2 | 3\* |  |
|  | **Total**  |  | **18** |  |

**Semester 4**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Credit** | **Prerequisite subject’s code** |
|  | MICR330363E | Microprocessor | 3 |  |
|  | DACO430664E | Data communication | 3 |  |
|  |  | Technical Electives\* | 3 |  |
|  | PRDI320263E | Digital Systems Lab | 2 |  |
|  | ELPR320762 | Electronics Practice | 2 |  |
|  | TEEN330345E | Technical English 3 | 3\* |  |
|  | LLCT230214E | Vietnamese Communist Party Policy of Revolution | 3 |  |
|  | **Total**  |  | **18** |  |

**Semester 5**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Cr** | **Prerequisite subject’s code** |
|  | DSIC330563E | Digital Systems Design with HDLs | 3 |  |
|  | DSPR431264E | Digital Signal Processing | 3 |  |
|  | PRMI320463E | Microprocessor Lab | 2 |  |
|  | LDAT411164E | Data Communication Lab | 1 |  |
|  | GELA220405E | General Laws | 2 |  |
|  |  | Humanities/Social Science Elective 1\*  | 2 |  |
|  | *Integrated-Circuits And Communications ( ICC) Area Core* |  |  |
|  | COSY330464 | Communication Systems | 3 |  |
|  | PRTE411464E | Senior Design Project 1 | 1 |  |
|  | *Industry Electronics System (IES) Area Core* |  |  |
|  | POEL330262E | Power Electronics | 3 |  |
|  | ELPR310863E | Senior Design Project 1 | 1 |  |
|  | **Total** |  | **17** |  |

**Semester 6**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Cr**  | **Prerequisite subject’s code** |
|  | EMSY435664E | Embedded Systems | 3 |  |
|  | LDSP412564E | Digital Signal Processing Lab  | 1 |  |
|  | PRDS320663E | Digital Systems Design with HDLs Lab | 2 |  |
|  |  | Humanities/Social Science Elective 2\*  | 2 |  |
|  | *Integrated-Circuits And Communications ( ICC) Area Core* |  |  |
|  | DICD436264E | Digital Integrated Circuits Design | 3 |  |
|  | WCSY431364E | Wireless Communication Systems | 3 |  |
|  | COSL420764 | Communication Systems Lab | 2 |  |
|  | PRTE411664E | Senior Design Project 2 | 1 |  |
|  | *Industry Electronics System (IES) Area Core* |  |  |
|  | PLCS330846E | Programmable Logic Controller | 3 |  |
|  | SETE331963E | Sensors and System Interfacing | 3 |  |
|  | POEP320262E | Power Electronics Lab | 2 |  |
|  | ELPR310963E | Senior Design Project 2 | 1 |  |
|  | **Total** |  | **17** |  |

**Semester 7**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Cr**  | **Prerequisite subject’s code** |
|  | ESPR427064E | Embedded Systems Lab | 2 |  |
|  | *Integrated-Circuits And Communications ( ICC) Area Core* |  |  |
|  | MIEN330364E | Microwave Engineering | 3 |  |
|  | WCSL422664E | Wireless Communication Systems Lab | 2 |  |
|  | GRPR433164E | Capstone Design Project 1 | 3 |  |
|  |  | Free Electives | 6 |  |
|  | *Industry Electronics System (IES) Area Core* |  |  |
|  | ELDR330545E | Automatic Electric Drive | 3 |  |
|  | PPLC321346E | Programmable Logic Controller Lab | 2 |  |
|  | GRAD431663E | Capstone Design Project 1 | 3 |  |
|  |  | Electives | 6 |  |
|  | **Total**  |  | **16** |  |

**Semester 8**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Code** | **Course Name** | **Cr**  | **Prerequisite** |
|  | *Integrated-Circuits And Communications ( ICC) Area Core* |  |  |
|  | GRPR423064E | Internship (ICET) | 2 |  |
|  | GRPR473264E | Capstone Design Project 2 | 7 |  |
|  | *Industry Electronics System (IES) Area Core* |  |  |
|  | GRPR324463E | Internship (IEET) | 2 |  |
|  | GRAD471763E | Capstone Design Project 2 | 7 |  |
|  | **Total** |  | **9** |  |

1. **Brief Course Description**
2. **Calculus I Credits: 3**

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

*Prerequisites: None*

*Former subjects of condition: None*

*Course Description*: 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.

*Textbook*:

*1*. K. Smith, M. Strauss and M. Toda, ***Calculus*** 6th National Edition–Kendall Hunt.

1. **Calculus II Credit: 3**

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

*Prerequisites: None*

*Former subjects of condition:* **Calculus I**

*Course Description*: 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.

*Textbook*:

*1*. K. Smith, M. Strauss and M. Toda, ***Calculus*** 6th National Edition–Kendall Hunt.

1. **Calculus III Credit: 3**

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

*Prerequisites: None*

*Former subjects of condition:* **Calculus II**

*Course Description*: 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, and 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.

*Textbook*:

*1*. K. Smith, M. Strauss and M. Toda, ***Calculus*** 6th National Edition–Kendall Hunt.

1. **Probability with Applications Credit: 3**

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

*Prerequisites: None*

*Former subjects of condition:*

*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.

1. **Principles of Physics 1 Credit: 3**

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

*Prerequisites: None*

*Former subjects of condition: None*

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

*Textbooks:*

1. R.A. Serway & J.W. Jewett; *Physics for Scientists and Engineers with Modern Physics*, 9th Edition; ISBN for bundle 9781285143811
2. Hallyday, R. Resnick, J. Walker, **Fundamentals of Physics**, John Willey & Sons,1999.
3. **Introduction to ECET Credit: 3**

*Distribution of learning time:* 2/1/4.6

*Prerequisites: None*

*Summaries of course:* This course provides the learnerwith knowledge of expected learning outcomes for Electrical & Electronics Engineering Technology, framework program and education program 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.

1. **Electric Circuits Credit: 4**

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

*Prerequisites: None*

*Former subjects of condition: Advanced Mathematics & General Physics*

*Course Description:* 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.

*Textbook:*

1. Introduction to Electrical Circuits, R. Dorf and J Svoboda, 8th Edition
2. **Basic Electronics Credit: 4**

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

*Prerequisites: Advanced Mathematics 3 & General Physics*

*Former subjects of condition:* Electrical Circuits& General Physics

*Course Description:* This course provides the learner with knowledge of electronic components, present the structure and principles of operation of the electronic 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.

*Textbooks:*

1. Thomas L.Floyd - Electronic Devices – Prentice Hall, 2012.
2. Albert Malvino - Electronic Principle- Mc Graw Hill, 2015
3. **Digital Systems Credit: 3**

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

*Prerequisites:* Basic Electronics

*Former subjects of condition:* Electrical Circuits& General Physics

*Course Description*: This course provides the learner with knowledge of digital systems, the basic logic gate, the fundamental theorem of Boolean algebra, the combinational circuits, sequential circuit, 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.

*Textbooks:*

1. Ronald J. Tocci, Neal S. Widmer, *Digital Systems*: Principles and Applications, 12th Ed. Prentice Hall, 2015
2. Anil K. Maini, *Digital Electronics*, John Wily & Sons, 2007
3. **Electrical Measurement and Instruments Credit: 3**

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

*Prerequisites:* Electrical Circuits

*Former subjects of condition:*Electrical Circuits, Basic Electronics

*Course Description:* This course provides the learner with 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.

*Textbook:*

1. PrithwirajPurkait, Budhaditya Biswas, Santanu Das, ChiranjibKoley, *Electrical and Electronics Measurements and Instrumentation,* McGraw - Hill, 2013
2. **Power Electronics Credit: 3**

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

*Prerequisites:* None

*Former subjects of condition:* Electrical Circuits; Basic Electronics; Electric Machines, Electricity Instrument; Electrical Measurement and Instruments.

*Course Description:*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, inverse and select the DC power supply.

*Textbook:*

1. N. Mohan, T. M. Undeland and W. P. Robbins, “Power Electronics: Converters, Application and Design,” John Wiley, 3rdEdition.
2. **Automatic Control Systems Credit: 3**

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

*Prerequisites:* None

*Former subjects of condition:* Electrical Circuits, Electrical Measurement and Instruments, Complex Functions and Laplace Transforms, Basic Electronics

*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.

1. **Microprocessor Credit: 3**

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

*Prerequisites:* Digital System

*Former subjects of condition:*Digital System, Basic Electronics.

*Course Description:* This course provides the learnerwith knowledge of 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 program the microcontroller.

*Textbooks:*

1. Martin P. Bates, *PIC Microcontrollers, Third Edition: An Introduction to Microelectronics*, Newnes; 3 Edition, 2011.
2. Richard H. Barnett, Sarah Cox, Larry O'Cull, *Embedded C Programming and the Microchip PIC*, Delmar Publishers Inc, 1 edition, 2003.
3. **Electrical Safety Credit: 2**

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

*Prerequisites:* None

*Former subjects of condition:* Electrical Circuits, Electrical Measurement and Instruments.

*Course Description:* This course provides the learner with knowledge of basic concepts of electrical safety, operating methods for electrical equipment and electrical networks are safety, measures to prevent dangerous electric shock, measures to avoid direct and spread lightning, grounding measures, help people when electrical accident.

*Textbooks:*

1. Electrical Safety Handbook, Fourth Edition, P.E. John Cadick, M. D. Mary Capelli- Schellpfeffer, M.P.A. Dennis K. Neitzel, C.P.E. Al Winfield, 2012.
2. Indoor Electrical Safety Check, Electrical Safety Foundation International, 2004.
3. Outdoor Electrical Safety Check, Electrical Safety Foundation International, 2004
4. **Power Supply System Credit: 3**

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

*Prerequisites:* None

*Course Description:* 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.

*Textbooks:*

1. Electric Power Transmission and Distribution, [S. Sivanagaraju](https://www.google.com.vn/search?tbo=p&tbm=bks&q=inauthor:%22S.+Sivanagaraju%22), 2008.

*Reference books:*

1. Electric Power Distribution Engineering, Third Edition, Turan Gonen, 2008.
2. Electrical Distribution Engineering; Anthony J. Pansini, 2006.
3. Electric Power Distribution Equipment and Systems; T. A. Short, 2004.
4. Electric Power Substations Engineering; John D. McDonald, 2012.
5. Power System Operation, 3rd Edition by [Robert Miller](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&text=Robert+Miller&search-alias=books&field-author=Robert+Miller&sort=relevancerank), [James Malinowski](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&text=James+Malinowski&search-alias=books&field-author=James+Malinowski&sort=relevancerank), 1994.
6. **SCADA systems Credit: 2**

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

*Prerequisites:* None

*Former subjects of condition:* electrical circuit, electrical machine-instrument; electrical measurement and instrument; power supply system,power system.

*Summaries of course:* the course content 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.

1. **Electronics Practice Credit: 2**

*Distribution of learning time: 0*/2/1.3

*Prerequisites:* Basic electronics

*Former subjects of condition:* electrical circuit, electrical and electronic materials, basic electronics, electricity in practice, electrical measurement and instrument in practice, electrical safety.

*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, OPAM; 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.

1. **Electric Practice Credit: 1**

*Distribution of learning time: 0*/1/0.6

*Prerequisites:*electrical safety, electrical circuit

*Former subjects of condition:* electrical circuit, electrical and electronic materials, basic electronics, electrical measurement and instrument in practice, electrical safety.

*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.

1. **Power electronics Lab Credit: 2**

*Distribution of learning time: 0*/2/1.3

*Prerequisites:*Basic Electronics, Electronic and Electrical Materials,

*Former subjects of condition:* Electrical Circuits,Electrical Circuits, Electrical Measurement in Practice, Electronics in Practice,Electrical Safety.

*Summaries of course:* This course provides learners knowledgeaboutinstallation 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,...

1. **Programmable Logic Controller Lab Credit: 2**

*Distribution of learning time: 0*/2/1.3

*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.

1. **Data communication Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signals and Systems, Electromagnetic Field, C Programming Language.

*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*.*

1. **Digital Signal Processing Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signals and Systems, Electromagnetic Field, C Programming Language.

*Summaries of course*: Digital Signal Processing begins with a discussion of the analysis and representation of discrete-time signal systems, including discrete-time convolution, difference equations, the z-transform, and the discrete-time Fourier transform. Emphasis is placed on the similarities and distinctions between discrete-time. The course proceeds to cover digital network and nonrecursive (finite impulse response) digital filters. Digital Signal Processing concludes with digital filter design and a discussion of the fast Fourier transform algorithm for computation of the discrete Fourier transform.

1. **Signals and Systems Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Electromagnetic Field, C Programming Language, Basic Electronics.

*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.

1. **Embedded Systems Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* C Programming Language, Digital signal processing, Microprocessor, Digital system

*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.

1. **Microwave Engineering Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Basic Electronics, Communication Electronics, Digital signal processing.

*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.

1. **Communication systems Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Basic Electronics, Communication Electronics, Digital signal processing.

*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, bandpass 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).

1. **Antennas and propagation Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Basic Electronics, Communication Electronics.

*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; microstrip antennas; horn and satellite antennas.

1. **Wireless** c**ommunication systems Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Data communication, Communication Electronics, Antennas and Propagation.

*Summaries of course*: This course provides students the knowledge of advanced wireless communication systems. Content of course: diversity techniques; MIMO; OFDM; satellite and viba transmission systems; principle, fundamental parts, operation of mobile communication systems such as GSM, WCDMA and LTE; technical solutions for the 5th 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.

1. **IC Design Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Basic Electronics, Digital System.

*Summaries of course*: Device fundamentals of CMOS field effect transistors and BiCMOS bipolar transistors. Device parameters and performance factors important for VLSI devices of deep-submicron dimensions. 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 for VLSI applications. 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 (interconnects, passive devices, and MOS devices), micro-optical devices (CDRs, etc.) and micro electromechanical devices (micro-motors, micro-mirror arrays, etc.)

1. **Mobile** c**ommunication Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Data communication, Communication Electronics, Wireless Communication Systems.

*Summaries of course*: This course will cover recent developments in wireless communication systems. Several cutting-edge wireless communication systems and the technologies behind these systems will be discussed. The topics to be covered are listed as follows: Fundamentals of Wireless Communications, Wireless Transmission for Digital TV and Mobil TV, LTE / LTE-A Cellular System, Near Field Communications, Underground Wireless Communications, Underwater Wireless Communications.

1. **High Frequency circuits Credit: 2**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Communication Electronics, Wireless Communication Systems.

*Summaries of course*: This course examines microwave engineering with a strong emphasis on circuits. 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.

1. **Optical** c**ommunication Credit: 3**

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

*Prerequisites:*

*Former subjects of condition:* Signal and System, Basic Electronics, Communication Electronics.

*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.

1. **Campus Infrastructure**

Follow the Ministry of education and training’s regulations.

**11.1 Workshops and Laboratories:**

* Electricity in Practice Laboratory
* Electronics in Practice Laboratory
* Instrument in Practice Laboratory
* Electrical machine in Practice Laboratory
* Electrical Drive in Practice Laboratory
* Programmable Logic Controller in Practice Laboratory
* Power Supply System in Practice Laboratory
* GE-UTE Training Center

**11.2 Library, Website**

* University’s Library
* Faculty’s Library
* Faculty’s Website
1. **PROGRAM GUIDE**

- Credit hour is calculated as:

 1 credit = 15 lecture hours

 = 30 laboratory hours

= 45 hours of practice

 = 45 hours of self-study

 = 90 workshop hours.

 = 45 hours for project, thesis.

* Graduation thesis: conduct a research project to solve specific problems related to the major.

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