

**VIETNAM NATIONAL UNIVERSITY
UNIVERSITY OF INFORMATION TECHNOLOGY**



EDUCATION PROGRAMME

**ENGINEER OF
COMMUNICATIONS AND
COMPUTER NETWORKS**

SEPTEMBER, 2013

Contents

| | |
|--|----|
| 1. INTRODUCTION | 3 |
| 1.1 Education goals..... | 3 |
| 1.2 Education philosophy of the training programme: | 4 |
| 1.3 Form and duration of education | 4 |
| 2. ADMISSION CRITERIA | 4 |
| 3. EXPECTED LEARNING OUTCOME | 5 |
| 3.1 The Learning outcome of Engineer of Communications and Computer Networks.. | 5 |
| 3.2 Position and ability to work after graduation | 7 |
| 4. COURSES AND LEARNING OUTCOMES MATRIX | 8 |
| 5. Education program | 11 |
| 5.1 Knowledge block ratio..... | 11 |
| 5.2 Fundamental Education Knowledge..... | 11 |
| 5.3 Professional education knowledge | 12 |
| 5.4 Projects, internships and graduation thesis..... | 14 |
| 6. TEACHING PLAN | 15 |
| 6.1 Curriculum map..... | 15 |
| 6.2 Prototype Teaching Plan..... | 16 |
| 7. GRADUATION CONDITIONS | 18 |
| 8. BRIEF DESCRIPTION OF COURSE CONTENTS | 18 |
| 8.1 GENERAL COURSES | 18 |
| 8.2 MAJOR COURSES..... | 22 |
| 8.3 PROJECTS, INTERNSHIPS AND GRADUATES | 31 |

UNIVERSITY EDUCATION PROGRAMME

Awarding and Teaching by: The University of Information Technology
Details of the accreditation by a professional or statutory body: VNUHCM

Name of the final award: Engineer

Program title: Engineer of Communications and Computer Networks

Education level: Undergraduate – 4.5 years

Professional: Communications and Computer Networks

Program code: 52480102

Number of credits: 148

1. INTRODUCTION

With the rapid development of networking and Internet technology and applications, the demand for computer networking specialist has grown rapidly. There is a high demanding on the jobs market for network engineers who have special knowledge in the area of computer networks and communications. The requirements include soft skills, hard skills which deep knowledge in the area of computer networks and data communications, and the ability to self-educating to promote lifelong learning.

The Education Program of "Communications and Computer Networks Engineering" is built to provide the fundamental knowledge and the ability to do specialize research in the area of computer networks and communications. Students have also trained the ability to do self-learning to improve their knowledge to adapt to the fast-changing and development of the networking technology and the demand of the economy and the society.

1.1 Education goals

- Training the engineers with the best knowledge in the area of Communications and Computer Networks, and virtue.

- Understand fundamental and deep professional knowledge, applied research, applications, design, maintain, manufacture, test, secure, administer the computer networks and data communications systems.
- Graduates can undertake the functions, consultancy, and implementation as a specialist in the field of Communications and Computer Networks.

1.2 Education philosophy of the training programme:

Networks are integral to the functioning of every business and expertise in the role is increasingly sought after by IT leaders. The daily job duties of the average enterprise network engineer are becoming increasingly fluid over time. This evolving role will require network engineers have a broader skill set to properly align the network with business goals.

The Communications and Computer Networks Engineers training programme is built on the two mainstream "Virtus et Sapientia" which emphasize on the ethics of the network engineers and the highest knowledge. In which, the education programmes provide:

- Interdisciplinary and high applicability that meet the requirements for the job market.
- A highly compatible with the international education programs in the area of computer networks and communications in developed countries which help students easier to study abroad or postgraduate.

1.3 Form and duration of education

- Formal undergraduate training
- Duration: 4.5 years (9 semesters)

2. ADMISSION CRITERIA

Applying to UIT for the degree of Engineer in Communications and Computer Networks is a challenging task for students. All A group or A1 group students who have a high school graduation score as required by the admissions committee of the University of Information Technology. The A group: Mathematics, Physics, and Chemistry. The A1 group: Mathematics, Physics, and English.

Students are trained formally according to the regulation number 25/2006/QĐ-BGD&ĐT issued in 26/6/2006 of the Minister, Ministry of Education and Training and the higher education regulation of the credit system of the University of Information Technology.

Students are recognized as graduates meeting the standards under the Ministerial Regulation No. 25/2006 / QD-BGD & DT dated 26/6/2006 of the Ministry of Education and Training, Framework for Higher Education Regular education system as well as the UIT's credit system regulations.

Graduate is awarded an Engineer Degree in Communications and Computer Networks.

3. EXPECTED LEARNING OUTCOME

3.1 The Learning outcome of Engineer of Communications and Computer Networks

Graduates of the Communications and Computer Networks Engineering program must meet the following output criteria:

| | |
|------------|--|
| 1 | Knowledge |
| 1.1 | Knowledge of basic sciences |
| 1.1.1 | Mathematics |
| 1.1.2 | Physics |
| 1.2 | Knowledge in the area of Information Technology |
| 1.2.1 | Computer Architecture |
| 1.2.2 | Operating Systems |
| 1.2.3 | Computer Networks |
| 1.2.4 | Basic Programming |
| 1.2.5 | Data structures and Algorithms |
| 1.2.6 | Data structures |
| 1.3 | Fundamental knowledge Communications and Computer Networks Professional |
| 1.3.1 | Communications |
| 1.3.2 | Network Applications Development |
| 1.3.3 | Fixed Networks and Mobile Networks Design |
| 1.3.4 | Network appliances and Network Administrations |
| 1.3.5 | Information Security |
| 1.3.6 | Secure Computer Networks |
| 1.3.7 | Information and Signal Processing |
| 1.3.8 | Network Programming |
| 1.4 | Social Knowledge |
| 2 | Skills |
| 2.1 | Argument analysis and problem solving |
| 2.1.1 | Identify problems, problems modeling |
| 2.1.2 | Evaluate the solution and make recommendations |

| |
|---|
| |
| <p>2.2 Test, research and explore knowledge</p> <p>2.2.1 Demonstrate hypotheses</p> <p>2.2.2 Documentary, experimental, validation and hypothesis testing</p> |
| <p>2.3 System thinking</p> <p>2.3.1 Global thinking</p> <p>2.3.2 Sequence priority and focusing</p> |
| <p>2.4 Formulation ideas, system engineering</p> <p>2.4.1 Understand needs and set goals</p> <p>2.4.2 Project Development Management</p> |
| <p>2.5 Design</p> <p>2.5.1 Processes of design and approach</p> <p>2.5.2 Specialized and multidisciplinary design</p> |
| <p>2.6 Deployment</p> <p>2.6.1 Design of sustainable deployment process</p> <p>2.6.2 Test, validate, certify, administration</p> |
| <p>2.7 Operation, Evaluation, Verification, Improvement</p> <p>2.7.1 Design and Optimization of Sustainable and Secure Operation System</p> <p>2.7.2 Training, operation, management, improvement and cancellation of the system</p> |
| <p>2.8 Teamworks</p> <p>2.8.1 Effective team formation</p> <p>2.8.2 Team activity and team leader</p> |
| <p>2.9 Communication</p> <p>2.9.1 Communication skills: listening, speaking, reading, writing and presentation</p> <p>2.9.2 Negotiation skills and development of social relationships (social networking)</p> |
| <p>2.10 Foreign language skills</p> <p>2.10.1 Reading and writing professional materials</p> <p>2.10.2 Communication in English</p> |
| <p>3 Behavior</p> |
| <p>3.1 Personality</p> <p>3.1.1 Independence, self-confidence</p> <p>3.1.2 Creativity, adaptability, willingness to make decisions</p> |
| <p>3.2 Attitudes, thoughts and learning</p> <p>3.2.1 Self-development of professional knowledge, learning and lifelong learning</p> <p>3.2.2 Creative, critical thinking</p> |
| <p>3.3 Ethics, equity and social responsibility</p> <p>3.3.1 Ethics, Integrity and Social Responsibility</p> <p>3.3.2 Be proactive for the future and plan for life</p> |

3.4 Organizational, social and environmental background

3.4.1 Roles and responsibilities of the engineer for the organization, society and the environment

3.4.2 New technology development and evaluation

3.2 Position and ability to work after graduation

Graduates can work as Analysts, Network Designers, Network Administrations, Operation officers and Security for Communications and Computer Networks in networking related institutions, companies.

In addition, the graduates can work as researchers and application staffs in information technology institutes, research centers, colleges, and universities.

Moreover, the graduates can learn more to become lecturers in information technology in universities, colleges, high schools, vocational secondary schools and vocational schools.

5. Education program

5.1 Knowledge block ratio

| Knowledge block | | Credits | Notes |
|-------------------------------------|---|--------------------|-------|
| Fundamental Education Knowledge | Politics courses | 10 | |
| | Math-ICT- Natural sciences | 27 | |
| | Foreign Languages | 12 credits | |
| | Physical training and defense education | (separate credits) | |
| Professional education knowledge | Fundamental professional knowledge | 23 | |
| | Professional Knowledge | 38 | |
| | Specialize knowledge | 9 | |
| | Elective courses | 12 | |
| Thesis, graduation capstone project | Internship, Projects | 7 | |
| | Thesis, graduation capstone project | 10 | |
| Total credits | | 148 | |

5.2 Fundamental Education Knowledge

Total 37 credits, excluded foreign language, physical education, and defense education.

| STT | Course ID | Course name | TC | LT | TH |
|--------------------------------------|-----------|---|-----------|----|----|
| Politics courses | | | 10 | | |
| 1 | SS001 | Fundamental Principles of Marxism – Leninism | 5 | 5 | |
| 2 | SS002 | The revolutionary way of the communist party of Vietnam | 3 | 3 | |
| 3 | SS003 | Ho Chi Minh thought | 2 | 2 | |
| Math – ICT – Natural Sciences | | | 27 | | |
| 4 | MA001 | Calculus 1 | 3 | 3 | |
| 5 | MA002 | Calculus 2 | 3 | 3 | |
| 6 | MA003 | Linear Algebra | 3 | 3 | |
| 7 | MA004 | Discrete Structures | 4 | 4 | |
| 8 | MA005 | Probability and statistics | 3 | 3 | |
| 9 | PH001 | Introduction to electrical engineering | 3 | 3 | |

| | | | | | |
|---|-------|---------------------------------|------------------|---|---|
| 10 | PH002 | Introduction to digital circuit | 4 | 3 | 1 |
| 11 | IT001 | Introduction to Programming | 4 | 3 | 1 |
| Physical Education - Defense Education | | | | | |
| 12 | PE001 | Physical Education 1 | Seperate credits | | |
| 13 | PE002 | Physical Education 2 | | | |
| 14 | ME001 | Military education | | | |

Foreign Language: Students must meet English output standards as follows

| | | |
|---|---|----------------------------|
| Students must complete 3 English subjects (AV1, AV2, AV3) with a score of 5.0 or higher for each subject and submit one of the 8 certificates in English equivalent to VNU - ETP or equivalent. B1 level according to CEFR as side table: | English B1 certificates in accordance with CEF are as follows | |
| | Certificates | Minimum Requirement |
| | IELTS | 4.5 |
| | TOEFL iBT | 45 |
| | TOEFL ITP | 430 |
| | TOEIC | 450 |
| | BULATS | 47 |

5.3 Professional education knowledge

Total 96 credits

Fundamental professional courses

| STT | Course ID | Course name | TC | LT | TH |
|---------------|-----------|-----------------------------------|-----------|-----------|----------|
| 1 | IT002 | Object Oriented Programming | 4 | 3 | 1 |
| 2 | IT003 | Data structures and algorithm | 4 | 3 | 1 |
| 3 | IT004 | Databases | 4 | 3 | 1 |
| 4 | IT005 | Introduction to Computer Networks | 4 | 3 | 1 |
| 5 | IT006 | Computer Architecture | 3 | 2 | 1 |
| 6 | IT007 | Operating Systems | 4 | 3 | 1 |
| Total: | | | 23 | 17 | 6 |

Professional courses

| STT | Course ID | Course name | TC | LT | TH |
|----------|-----------|---------------------------|----|----|----|
| 1 | NT101 | Networks security | 4 | 3 | 1 |
| 2 | NT103 | Linux Operating Systems | 4 | 3 | 1 |
| 3 | NT104 | Information Theory | 3 | 3 | |
| 4 | NT105 | Data communications | 4 | 3 | 1 |
| 5 | NT106 | Basic network programming | 3 | 2 | 1 |

| | | | | | |
|----------------|-------|--|-----------|-----------|-----------|
| 6 | NT109 | Network-application programming | 3 | 2 | 1 |
| 7 | NT118 | Mobile Application Development | 3 | 2 | 1 |
| 8 | NT111 | Network appliances and Multimedia Communications | 4 | 3 | 1 |
| 9 | NT113 | Network Design | 3 | 2 | 1 |
| 10 | NT402 | Communications technology | 3 | 2 | 1 |
| 11 | SS004 | Professional skills | 2 | 0 | 2 |
| 12 | IT009 | Introduction to IT disciplines | 2 | 2 | |
| Total : | | | 38 | 27 | 11 |

Specialize professional courses

Students choose one of two majors

- Major in "Communication and Information Security":

| STT | Course ID | Course name | TC | LT | TH |
|----------------|-----------|--|----------|----------|----------|
| 1 | NT303 | VoIP technology | 3 | 2 | 1 |
| 2 | NT331 | Enterprise information security policy | 3 | 2 | 1 |
| 3 | NT204 | Intrusion detection and prevention systems (IPS/IPS) | 3 | 2 | 1 |
| Total : | | | 9 | 6 | 3 |

- Major in "Network Management and Application Development":

| STT | Course ID | Course name | TC | LT | TH |
|----------------|-----------|---------------------------------|----------|----------|----------|
| 1 | NT206 | Computer network administration | 3 | 2 | 1 |
| 4 | NT208 | Web technology and applications | 3 | 2 | 1 |
| 3 | SE107 | System analysis and design | 3 | 3 | |
| Total : | | | 9 | 7 | 2 |

Elective courses

| STT | Course ID | Course name | TC | LT | TH |
|-----|-----------|--|----|----|----|
| 1 | NT333 | Net Computing | 3 | 2 | 1 |
| 2 | NT334 | Digital Forensics | 3 | 2 | 1 |
| 3 | NT205 | Network offences | 3 | 2 | 1 |
| 4 | NT330 | Wireless network and mobile security | 3 | 2 | 1 |
| 5 | NT332 | Signal processing in communications | 3 | 2 | 1 |
| 6 | NT207 | Risk management and information security in enterprises. | 3 | 2 | 1 |
| 7 | NT209 | Computer System programming | 3 | 2 | 1 |

Students are required to take four elective courses in which one can study no more than one subject which is compulsory for another.

5.4 Projects, internships and graduation thesis

Students take practical internships in the business and do graduate theses or graduate study subjects instead.

Project and corporate internship

| STT | Course ID | Course name | TC | LT | TH |
|----------------|------------------|---|-----------|-----------|-----------|
| 1 | NT117 | Network-based application programming project | 2 | 2 | |
| 2 | NT114 | Specialized project | 2 | 2 | |
| 3 | NT115 | Internship | 3 | 3 | |
| Total : | | | 7 | 7 | 0 |

Graduation thesis and graduation project

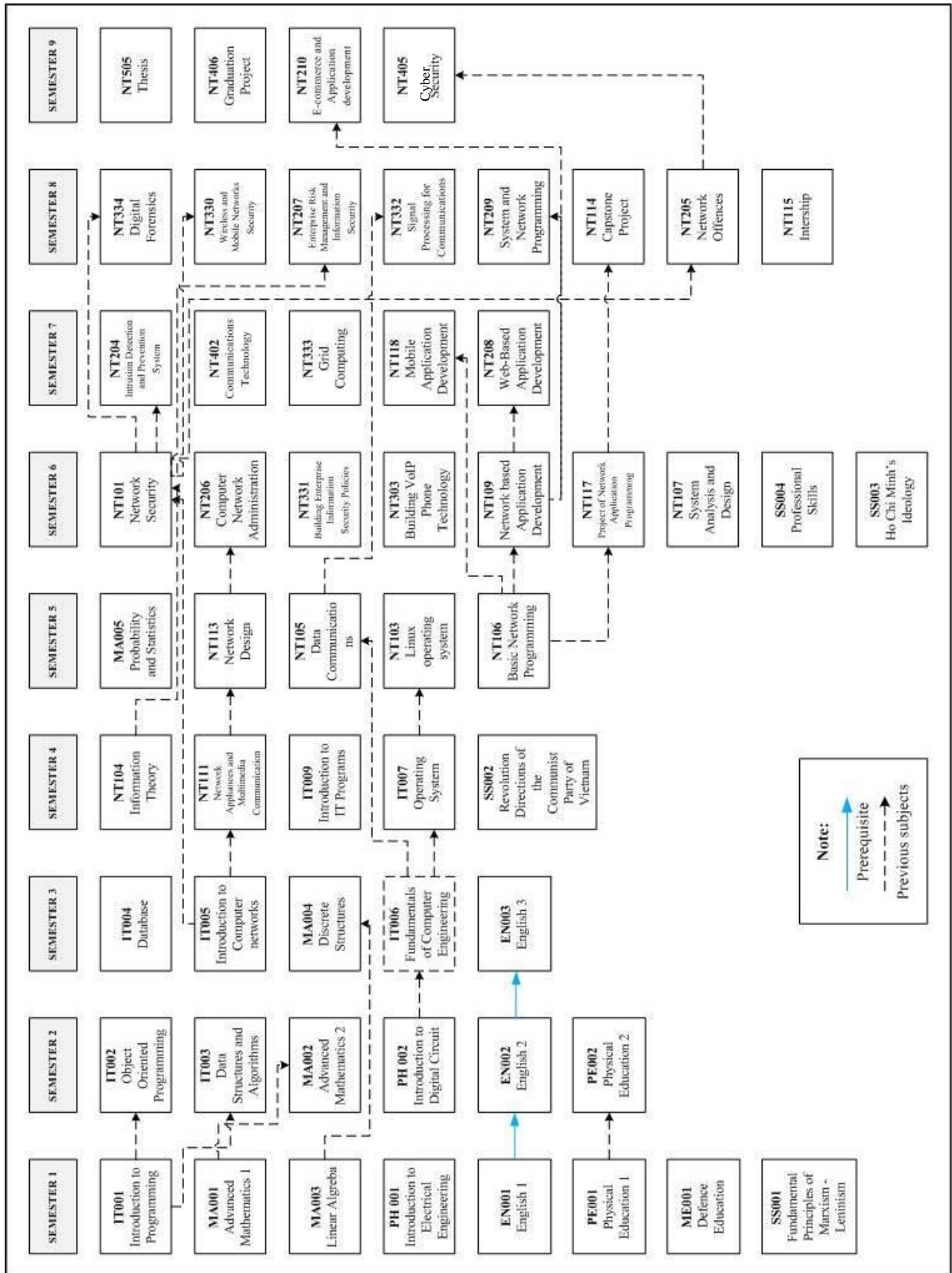
| STT | Course ID | Course name | TC | LT | TH |
|------------|------------------|--------------------|-----------|-----------|-----------|
| 1 | NT505 | Thesis | 10 | 10 | |

Or

| STT | Course ID | Course name | TC | LT | TH |
|----------------|------------------|----------------------------|-----------|-----------|-----------|
| 1 | NT405 | Cyber Security | 3 | 2 | 1 |
| 2 | NT210 | E-commerce and application | 3 | 2 | 1 |
| 3 | NT406 | Graduation project | 4 | 4 | |
| Total : | | | 10 | 8 | 2 |

6. TEACHING PLAN

6.1 Curriculum map



6.2 Prototype Teaching Plan

| Semester | Course ID | Course Name | Crd. | Theory/Prac. | |
|-----------|-----------|--|-----------------------------|--------------|----------|
| | | | | T | P |
| I | IT001 | Introduction to Programming | 4 | 3 | 1 |
| | MA001 | Calculus 1 | 3 | 3 | |
| | MA003 | Linear Algebra | 3 | 3 | |
| | IT009 | Introduction to IT disciplines | 2 | 2 | |
| | PH001 | Introduction to electrical engineering | 3 | 3 | |
| | EN001 | English 1 | 4 | 4 | |
| | PE001 | Physical education 1 | <i>Calculate seperately</i> | | |
| | ME001 | Military education | <i>Calculate seperately</i> | | |
| | | Total for semester 1 | 19 | 18 | 1 |
| II | IT002 | Object Oriented Programming | 4 | 3 | 1 |
| | IT003 | Data structures and algorithm | 4 | 3 | 1 |
| | PH002 | Introduction to Digital circuit | 4 | 3 | 1 |
| | MA002 | Calculus 2 | 3 | 3 | |
| | EN002 | English 2 | 4 | 4 | |
| | PE002 | Physical education 2 | <i>Calculate seperately</i> | | |
| | | Total for semester 2 | 19 | 16 | 3 |
| II | IT004 | Databases | 4 | 3 | 1 |
| | IT005 | Introduction to Computer Networks | 4 | 3 | 1 |
| | IT006 | Computer Architecture | 3 | 2 | 1 |
| | EN003 | English 3 | 4 | 4 | |
| | MA004 | Discrete Structures | 4 | 4 | |
| | | Total for semester 3 | 19 | 16 | 3 |
| IV | NT111 | Network appliances and Multimedia Communications | 4 | 3 | 1 |
| | NT104 | Information Theory | 3 | 3 | |
| | IT007 | Operating Systems | 4 | 3 | 1 |
| | SS001 | Fundamental principle of Marxism-Leninism | 5 | 5 | |
| | SS004 | Professional Skills | 2 | 0 | 2 |
| | | Total for semester 4 | 18 | 14 | 4 |
| V | NT113 | Network Design | 3 | 2 | 1 |
| | NT103 | Linux Operating System | 4 | 3 | 1 |
| | MA005 | Probability and statistics | | | |

| | | | | | |
|--------------|-----------------|---|------------|-----------|----------|
| | | | | 3 | |
| | NT105 | Data communications | | | 1 |
| | | | 4 | 3 | |
| | NT106 | Basic network programming | 3 | 2 | 1 |
| | | Total for semester 5 | 17 | 13 | 4 |
| VI | NT101 | Networks Security | 4 | 3 | 1 |
| | NT117 | Network-based application programming project | 2 | | 2 |
| | NT109 | Network-application programming | 3 | 2 | 1 |
| | SS002 | The revolutionary way of the communist party of Vietnam | 3 | 3 | |
| | | <i>Major course</i> | 3 | 2 | 1 |
| | | <i>Major course</i> | 3 | 2 | 1 |
| | | Total for semester 6 | 18 | 12 | 6 |
| VII | SS003 | Ho Chi Minh thought | 2 | 2 | |
| | NT402 | Communications Technology | 3 | 2 | 1 |
| | NT118 | Mobile Applications Development | 3 | 2 | 1 |
| | | <i>Major course</i> | 3 | 2 | 1 |
| | | <i>Elective course</i> | 3 | 2 | 1 |
| | | Total for semester 7 | 14 | 10 | 4 |
| VIII | NT115 | Internships | 3 | | 3 |
| | NT114 | Specialized project | 2 | | 2 |
| | | <i>Elective course</i> | 3 | 2 | 1 |
| | | <i>Elective course</i> | 3 | 2 | 1 |
| | | <i>Elective course</i> | 3 | 2 | 1 |
| | | Total for semester 8 | 14 | 6 | 8 |
| IX | Option 1 | | | | |
| | NT505 | Thesis | 10 | | |
| | Option 2 | | | | |
| | NT406 | Graduation project | 4 | | 4 |
| | NT405 | Cyber Security | 3 | 2 | 1 |
| | NT210 | E-commerce and applications | 3 | 2 | 1 |
| | | Total for semester 9 | 10 | 4 | 6 |
| Total | | | 148 | | |

7. GRADUATION CONDITIONS

Students may graduate from one of the following two majors:

- Communication and Information Security
- Network Application Development and Management

Students must accumulate a minimum of 148 credits allocated to the following modules:

- General education: 49 credits;
- Fundamental knowledge group: 23 credits;
- Fundamental knowledge: 38 credits;
- Compulsory knowledge in the field of graduation: 9 credits;
- Optional knowledge: minimum 12 credits;
- Internships and projects: 7 credits;
- Graduation knowledge: 10 credits in two options of graduation thesis or alternative courses under 6.4.2.
- Meet the standard of foreign language output in section 6.2.

In addition, students must meet other criteria in accordance with the Regulations of training credit under the University of Information Technology for the regular university by the President of the University of Information Technology issued. According to Decision 28 / QĐ-ĐHCNTT-ĐTĐH dated 28/01/2013.

8. BRIEF DESCRIPTION OF COURSE CONTENTS

8.1 GENERAL COURSES

8.1.1 Fundamental Principles of Marxism – Leninism

Credits: 05

Brief introduction:

- Goal and research method for fundamental Principles of Marxism – Leninism.
- The principles of dialectical materialism.
- Theory of dialectical materialism.
- Socio-economic formations.
- Procedure and motivation for social development.

8.1.2 Revolution Directions of the Communist Party of Vietnam

Credits: 03

Brief introduction:

The course supplies for student basic knowledges about revolution directions of the Communist Party of Vietnam, especially in the renovation period. The course consists of 8 sections:

- The establish of Communist Party of Vietnam and the first political platform of the Party.
- Rise to power (1930-1945)
- War for independence (1945 – 1975)
- Industrialize direction.
- Socialist-oriented market economy.
- The way to build political, culture and foreign Policy system.

8.1.3 Ho Chi Minh's thought

Credits: 02

Brief introduction: The course supplies for student basic knowledges about Ho Chi Minh's Ideology and the application of Ho Chi Minh's Ideology of our Party and State in the renovation period and in the revolution of Vietnam.

The course consists of 6 sections:

- The concept, original and process of forming Ho Chi Minh's ideology
- Ho Chi Minh's ideology about national issues and the revolution of Nation liberation.
- Ho Chi Minh's ideology about socialism and transitional road to socialism in Vietnam.
- Ho Chi Minh's ideology about great national unity: combining national strength with the power of the times
- Ho Chi Minh's ideology about the Communist Party of Vietnam
- Ho Chi Minh's ideology on morality, humanity and culture

8.1.4 Advanced Mathematics 1

Credits: 03

Brief introduction: The course supplies for student basic knowledges Advanced Mathematics and the way to apply theory in practical. This course also basic for next following courses.

- Limitation, derivative and differential of the real function.
- Single, ,multiple, line integral .

- Numeric sequences.
- Some issues of sliding theory.

8.1.5 Advanced Mathematics 2

Credits: 03

Brief introduction:

- Basic knowledge of normal differential equations and partial differential equations.
- Relations between the linear partial differential equation and some basic physics problems.
- How to solve the types of physics-math and the physical meaning of the solution.

8.1.6 Linear Algebra

Credits: 03

Brief introduction: After successfully completing the course, student will have a good understanding of the following topics and their applications:

- Systems of linear equations
- Row reduction and echelon forms
- Matrix operations, including inverses
- Block matrices
- Linear dependence and independence
- Subspaces and bases and dimensions
- Orthogonal bases and orthogonal projections
- Gram-Schmidt process
- Linear models and least-squares problems
- Determinants and their properties
- Cramer's Rule
- Eigenvalues and eigenvectors
- Diagonalization of a matrix
- Symmetric matrices
- Positive definite matrices

8.1.7 Discrete Structures

Credits: 04

Brief introduction: This course is designed to provide students of computer science and mathematics with several topics and ideas that will help them to develop and analyze algorithms as well as enable them to think about and solve problems in new ways. By the completion of the course students should be able to express ideas using mathematical notation and solve problems using the tools of mathematical analysis.

8.1.8 Probability and Statistics

Credits: 03

Brief introduction: This course is an introduction to probability and statistic for students in statistics, applied mathematics, electrical engineering and computer science. This core course is intended to provide a solid general background in probability and statistics that will form the basis of more advanced courses in statistics. Content:

- Probability: Axioms of probability, Conditional probability and independence, Conditional probability and independence, Random variables, expectation, and moments, discrete random variables, Continuous random variables, Pairs of random variables, Limit theorems.
- Theory of Statistics: Estimators and properties, Optimality, Maximum likelihood, Hypothesis tests, Confidence intervals, Bayesian statistics.

8.1.9 Introduction to electrical engineering

Credits: 03

Brief introduction:

Our primary goal is for you to learn to appreciate and use the fundamental design principles of modularity and abstraction in a variety of contexts from electrical engineering and computer science.

Our second goal is to show you that making mathematical models of real systems can help in the design and analysis of those systems, and to give you practice with the difficult step of deciding which aspects of the real world are important to the problem being solved and how to model them in ways that give insight into the problem.

Finally, of course, we have the more typical goals of teaching exciting and important basic material from electrical engineering and computer science, including modern software engineering, linear systems analysis, electronic circuits, and decision-making

8.1.10 Introduction to Digital Circuit

Credits: 04

Brief introduction:

This course is an introduction to digital circuit and system design. The material provides a top-down view of the VLSI system design. The underlying CMOS devices and manufacturing technology are introduced, but quickly abstracted into higher-level to focus the class on design of larger digital modules both in FPGA design environment and in ASIC design environment. Verilog hardware description language will be covered and used in class for digital design. Basic digital system design concepts, boolean operations/combinational logic, sequential elements and finite-state machines, will be described. Design of larger building blocks such as adders, multipliers, crossbars, I/O, as well as memory design (SRAM, Caches, FIFOs) and integration will be covered. Parallelism and pipelining micro-architectural concepts will be introduced. A number of physical design issues visible at the architecture level will be covered as well, such as interconnects, power, reliability.

8.1.11 Introduction to programming

Credits: 04

Brief introduction:

This course is an introduction to the fundamentals of computer programming, which is the foundation of Computer Science. Students design, write, and debug computer programs. No prior knowledge of programming is assumed.

8.2 MAJOR COURSES

8.3.1. Object Oriented Programming

Credits: 04

Brief Introduction:

- Knowledge and skills in object-oriented programming
- The properties of the object, inheritance and class
- Communication between objects

8.3.2. Data Structures and Algorithms

Credits: 4

Brief introduction: The course consist two parts: data structures and algorithms..

- Data Structures: the course introduce all basic structures that programmer must know and be able to using in building software such as: stack, queue, binary trees, hash map.
- Algorithms: the course present some vital algorithms such as: sort, search (KMP, Rabin Karp), archive algorithm (Run-Length, Huffman, LZW).

8.3.3. Fundamental of Database Systems

Credits: 04

Brief Introduction:

- Be able to design effective database schemas for realistic applications
- Become proficient in using relational, key-value, document, and graph database systems
- Understand the basics of transactions
- Gain an introductory background in indexing, concurrency control, and recovery

8.3.4. Introduction to Computer networks

Credits: 04

Brief introduction: The course introduces fundamental concepts in the design and implementation of computer communication networks, their protocols, and applications. Topics to be covered include: layered network architectures, applications, network programming interfaces (e.g., sockets), transport, physical media, data link protocols, local area networks and network routing. Examples will be drawn primarily from the Internet (e.g., TCP, UDP, and IP) protocol suite.

8.3.5. Operating System

Credits: 04

Brief introduction: The course introduces the principles from simple to complex of computer, consists 9 section. The first six chapters introduce the basics of an operating system. The following three chapters are the high-level part of course.

Fundamentals of computer engineering

Credits: 03

8.3.6. Brief introduction:

In this course you will learn about the design of digital electronic systems from simple digital circuits to the design of a simple processor. The exercises undertaken in laboratories complement the material covered in lectures. Professional commercial software tools are used in laboratories to enter designs and simulate their behaviour.. The course also supplies for student basic knowledge about Network such as: structure and TCP/IP model.

8.3.7. Network Security

Credits: 04

Brief introduction:

By the end of this course, students will be able to:

- Explain common network vulnerabilities and attacks, defense mechanisms against network attacks, and cryptographic protection mechanisms.
- Outline the requirements and mechanisms for identification and authentication. Identify the possible threats to each mechanism and ways to protect against these threats.
- Explain the requirements of real-time communication security and issues related to the security of web services. - Explain the requirements of non-realtime security (email security) and ways to provide privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, and anonymity.

8.3.8. Linux operating system

Credits: 04

Brief introduction: A study of the UNIX (Linux) operating system including multi-user concepts, terminal emulation, use of system editor, basic UNIX (Linux) commands, and writing script files. Topics include introductory systems management concepts, system configuration.

8.3.9. Information Theory

Credits: 03

Brief introduction:

This course will cover the following topics

- Information measures (entropy, divergence, mutual information): Convexity, monotonicity and continuity properties. Extremization, saddle point, capacity as information radius. Variational characterizations: Donsker-Varadhan and Gelfand-Yaglom- Perez. Entropy rates and theorem of Szego.
- Lossless data compression: Variable length and fixed length (almost lossless). Linear compression. Slepian-Wolf problem. Ergodic sources: Shannon-McMillan and Birkhoff-Khinchine theorems. Basics of universal data compression. Optimality of Lempel-Ziv.
- Lossy data compression: Scalar quantization and Panter-Dite approximation. Vector quantization and rate-distortion theorem. Separation principle.

8.3.10. Data communications

Credits: 04

Brief introduction: This course will provide for student basic knowledge about data transfer technical, encryption and decryption data. The course also emphasizes in digital data and multiplex-demultiplexing technical.

8.3.11. Basic Network Programming

Credits: 3

Brief introduction: After finishing this course, student can:

- Design either a TCP or UDP application (client-server)
- Able to develop distributed application such as: Web services, .NET remoting (or RMI, CORBA)

8.3.12. Network-Based Application Development

Credits: 03

Brief introduction:

- Basic knowledge of web application and application development model
- J2EE technology
- MVC framework and common frameworks: Struts / Spring
- Secure network applications

8.3.13. Mobile Application Development

Credits: 03

Brief introduction: This course teaches how to develop applications for mobile devices such as iPhones and iPads (iOS). We will go through the process of building a mobile

application from start to finish using the iOS SDK (Software Development Kit). In lecture sessions, you will learn the basics of the Objective-C programming language, how to design mobile interfaces, how to use the libraries to build applications that have the proper look and feel, how to use table views, how to design and handle user input, and other aspects as time permits. During the lab sessions, students will create applications using the Xcode IDE (Integrated Development Environment).

8.3.14. Network Appliances and Multimedia Communications

Credits: 04

Brief introduction:

- Configuration and configuration of devices such as switches, routers ...
- Common routing algorithms such as RIP, OSPF.
- Virtual Local Area Network (VLAN)
- How to configure the access control list
- NAT, PAT
- Some WAN connection methods
- Multimedia technology and standards
- Some applications of multimedia communication

8.3.15. Network Design

Credits: 03

Brief introduction: The course supplies for student basic knowledges about Analyze the goals of network design, network characteristics. Design a network topology, equipment selection and software. Network security and management strategies. Technology and equipment for campus network, enterprise network. Check the network design and optimize the network design. Building network design documents.

8.3.16. Communications Technology

Credits: 03

Brief introduction: This subject is for students in the Computer and Telecommunication Faculty, which aims to equip students with the knowledge of optical network communication.

8.3.17. Professional skills

Credits: 02

Brief introduction: The subject provides skills to support the professional and technical capacity needed in the IT field for students at the University of Information Technology. Based on the methodology of approaching the system, the content of the student-centered subject to the active implementation of the learning process and self-study and graduation with good moral qualities, knowledge and professional skills. meet the working requirements of the society.

- Reading, listening and writing skills
- Conversational skills
- Self-learning skills
- Teamwork skills
- Skills to observe, identify and solve problems
- Presentation and conferencing skills
- The ability to organize work
- Practical skills
- Skills in writing and writing reports

8.3.18. Introduction to IT programs

Credits: 2

Brief introduction: The course provides information on the IT industry in general and the specializations in depth including: Computer Science, Computer Engineering, Software Engineering, Computer Networks & Communication and Information Systems.

8.3.19. Building VoIP Phone Technology

Credits: 03

Brief introduction: The course provides an overview of the evolution of the Internet and IP telephony technologies, signaling and call handling protocols. The subject also deals with techniques of compressing voice signals including the general principle of compression. Addresses, numbering, routing between traditional telephone network (PSTN) and IP telephony and quality of IP voice services, endpoint devices and software. deploying IP telephony network. The course also covers Cisco VoIP technologies and Asterisk open source code, which provides in-depth programming of a voice network with Asterisk open source.

8.3.20. Wireless and Mobile Networks Security

Credits: 03

Brief introduction: Basic security concepts and knowledge required for security issues assessment. Security issues and solutions for wireless and cellular technology such as Bluetooth, WiFi, WiMax, 2G and 3G. Security techniques are used to protect applications downloaded to mobile devices via cellular networks. Security issues and solutions in wireless and mobile technologies such as sensor networks, 4G cellular networks and IMS networks.

8.3.21. Building Enterprise Information Security Policies

Credits: 03

Brief introduction: Law, investigation and ethical issues. Information security policy standard. Basic system security enhancements. Identify potential threats to the system. Standard construction suitable for scale, infrastructure and enterprise characteristics.

8.3.22. Intrusion Detection and Prevention System

Credits: 03

Brief introduction: This course is designed to give students practical, working knowledge in intrusion detection and traffic analysis. The students will gain an understanding of the workings of TCP/IP, methods of network traffic analysis and one popular network intrusion detection system Snort.

8.3.23. Signal Processing for Communications

Credits: 03

Brief introduction: This course is designed to give students the knowledge of digital and sequential signals, spectrum of signals, A / D and D / A conversion. Students learn about transformations in the processing of digital signals such as Z transform, Fourier transform; design of FIR, IIR filters; Communication channels and design of digital communication systems. The subject also deals with issues related to signal processing in Telecommunications, Mobile Communications, and Wireless. Students learn and practice with Matlab software.

8.3.24. Computer Network Administration

Credits: 03

Brief introduction: This course is designed to provides knowledge about network, network technology and networking equipment such as hub, switch, router, the

architecture and network management protocols and content related to SNMP management, broadband management, TMN.

8.3.25. Enterprise Risk Management and Information Security

Credits: 03

Brief introduction: The over-arching aim of this course is to provide an overview of risk management principles and ensure students gain a strong grounding in the risk management discipline and provide an opportunity to apply a contextual risk management framework.

8.3.26. Web-Based Application Development

Credits: 03

Brief introduction:

- The course equips students with resources for design, production, and evaluation of web applications and strategies for locating these resources.
- Motivate student's interest in learning Web-app development by giving them an insight into it's possibilities through practical applications.
- Provide a sufficiently broad but practical introduction to Server-side web technologies.

8.3.27. System Analysis and Design

Credits: 03

Brief introduction: The course supplies for student basic knowledges about:

- System analysis: basic concepts, architecture, system tasks, system stages and states.
- System design and development, including system development strategies, system specifications, system development issues, decision support analysis, and validation and validation procedures.

8.3.28. System programming and Network

Credits: 03

Brief introduction: This course provides students with in-depth knowledge of the system. Students will learn Unix system programming skills, threading concepts, multi-threading, system calls, system resources and network management. From then on it

helped in the development of software development on the Unix platform, supercomputer.

8.3.29. Net computing

Credits: 03

Brief introduction: Provide students with knowledge of grid computing, architecture, and components of grid computing; Standards support grid computing: OGSI, OGSA; development of grid computing system, basis of grid management and development, network security; grid communication system

8.3.30. Digital Forensics

Credits: 03

Brief introduction: Overview of digital evidence; Method of collecting network traffic and other evidence; Method of decoding a TCP Header using the Snort tool, using the NetFlow application, using the SilentRunner NetWitness tool and AccessData digital evidence investigation on the computer; Incorporate digital evidence into incident response plans; Internet authentication, cloud computing and their relationship; Network diagnostic skills and network diagnostic skills cycle

8.3.31. Network Offences

Credits: 03

Brief introduction:

- Theoretical knowledge of common security vulnerabilities exist in the network, operating system, applications.
- Detection methods based on detected vulnerabilities.
- Steps to take control of the system, change data or denial of service ...
- Build a defensive system that prevents attacks

8.3.32. Cyber Security

Credits: 03

Brief introduction: The main topics of the course include:

- Overview of Internet security
- An attacker's motive
- Exploration, network scanning and listing

- System attack
- Malicious software (Virus, Worm, Trojan, Backdoor, Rootkit)
- Eavesdropping
- Fraudulent techniques
- Denial of service attacks
- Firewalls and intrusion detection systems
- System testing techniques and countermeasures

8.3.33. E-commerce and Application development

Credits: 03

Brief introduction: This course is designed to provide students with an overview of e-commerce computing and an analysis of the architectures, technologies, practices, and trends of e-commerce systems from both technical and managerial perspectives.

Multiple instructional methods will be used in this class. As the primary method, lectures will be given to cover major e-commerce subjects as listed in the weekly schedule below. To gain students a practical understanding of the subjects through a proof-of-concept approach, in-class, live demos of the development and use of real-world e-commerce systems will be an active component of class sessions whenever needed. Throughout the class, students will also be asked to collaboratively participate in presentations and discussions on research opportunities for various e-commerce subjects.

8.3 PROJECTS, INTERNSHIPS AND GRADUATES

8.3.1 Internship

Credits: 3

Brief introduction: In the final internship program, students must come to practice in companies and non-business units in the field in order to familiarize themselves with the actual environment of the profession; capture the work; learn experiences in the process of working in the practice unit, handle the situation arising in the professional field that students have chosen.

8.3.2 Project of Network Application Programming

Credits: 2

Brief introduction: The web application programming project requires students to apply all knowledge related to application programming to implement an online deployment application under the guidance of the instructor.

8.3.3 Capstone Project

Credits: 2

Brief introduction: Specialized projects require students to apply all the knowledge and skills they have learned to solve a practical problem of the subject chosen by the student under the guidance of the instructor.

8.3.4 Graduation Project

Credits: 4

Brief introduction: The graduation project is a practical result demonstrating the student's practical ability to finish the engineering degree. The graduation thesis is a topic that emphasizes research in technology and test implementation, which demonstrates the student's ability to learn and execute independently. Graduation projects should state the results of the student's technology and student performance, which are the most important components of the graduation project.

8.3.5 Thesis

Credits: 10

Brief introduction: The graduation thesis is a scientific research project for students in the engineering degree program. Graduation thesis is a topic that is researched and developed in depth to show the ability to work independently of students. In the thesis, the students clarify the problems that students carry out under the guidance of instructors such as: application, operation process, deployment system. In addition, the thesis should have the evaluation, development direction of the topic. In the thesis that the performance of students, this is the most important component of the thesis