THE UNIVERSITY OF DANANG

UNIVERSITY OF SCIENCE AND TECHNOLOGY

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PROGRAM SPECIFICATION

(For enrollment year 2017 onward)

ELECTRONIC AND TELECOMMUNICATION ENGINEERING

CODE: 52905206

Prepared by
Faculty of Electronic and Telecommunication Engineering, University of Science and Technology
(Based on the 2015 curriculum)

Đà Nẵng - 2017

CONTENTS

EDUCATION PROGRAM

(Issued under Decision No.845/ĐHBK-ĐT dated August 14th , 2015, by the Rector of The University of Da Nang-University of Science and Technology (UD-DUT))

1. General information on education program

1.1. Introduction on education program

The Faculty of Electronics and Telecommunications has a long tradition in educating human resources in the field of Electronics and Telecommunications for the provinces in the Central areas, Central Highlands as well as the whole country. Job's opportunity of ETE Students are always quite high and education quality is admited by the society. Currently, the Faculty of Electronic and Telecommunication engineering educates three academic levels including undergrade, Master and PhD.

The education program of the Electronics and Telecommunication Engineering (ETE) was originally designed according to academic year. In 2009, the program shifted to credit-based education including 180 credits, with education duration of 5 years. By 2012, the total volume of knowledge reduced to 150 credits, the education duration was still 5 years. Since 2015, the ETE program has been applied with a total knowledge of 152 credits but the education duration has been decreased to 4.5 years to meet the demand of learners as well as their job opportunity.

1.2. General information

Program title:	Electronic and Telecommunication Engineering
Code number:	52905206
Awarding institute:	University of Science and Technology, The University of Danang
Mode of study:	Full time
Final award	The degree of Engineering
Management Faculty:	Faculty of Electronic and Telecommunication Engineering
Teaching institutes:	The University of Danang: - University of Science and Technology - University of Education - University of Foreign Language Studies - University of Economics

Education duration:	4.5 years
Total credits:	152 (excluding "Physical Education" and "Defense Education - Security")
Language:	Vietnamese
Professional accreditation:	On-going AUN accreditation
Website:	http://ete.dut.udn.vn/
Lasted update:	December, 2015

1.3. Education Philosophy

Education philosophy of UD-DUT was announced in Decision No. 34/QD-DHBK on January 28th, 2015 of the Rector of UD-DUT.

"Thinking, Creating and Humanity Cherishing".

1.3.1. General meaning of the philosophy

Philosophy of Education is the guidance of specific goals of national education, which is suitable to different periods in history. The philosophy is the expectation of every citizen in contributing knowledge, strength and responsibilities to the country.

With the philosophy "Thinking, Creating and Humanity cherishing", the University of Sciences & Technology sets the goal of training students to have enough skills and spirit; the ability to think, create and criticize; understand and and have national responsibilities.

1.3.2. Contents of Philosophy of Education

- Thinking: is a necessary task in studying. Thinking enables students to comprehend knowledge thoroughly. This is the foundation of self-study, discovery, criticism and knowledge enhancement.
- Creativity: Having creativity means students can find out new things from sciences and technology, which helps to enhance living standards. Creativity creates invention and practical application.
- Humanity cherishing: Humanity reminds student of living without selflessness, taking the community responsibilities, becoming nice citizens and having gratitude to their parents.

The Philosophy's contents of UD-DUT meet with the country's requirements of innovation, satisfying studying demands of students of any ages: learn to think, to be helpful to the community. This is the decisive goals and missions of the University as well as the orientation to every studying activity. Especially, the education philosophy brings peace to people's minds when facing morality deviations.

1.4. Vision and Mission

1.4.1. Vision

Faculty of Electronic and Telecommunication Engineering (ETE)-The University of Danang-University of Science and Technology (UD-DUT) will become a leading faculty in Electronic and Telecommunication field in Vietnam as well as in Southeast Asia

1.4.2. Mission

ETE educates and provides high quality engineering and technology resources in Electronic and Telecommunication field to meet the need of sustainable socio-economic development in the Central area and Highlands as well as in Vietnam.

1.5. Program Objectives (POs)

The program aims to educate the engineers of the Electronics and Telecommunications (ETE) Engineering with the following abilities:

1. Analyze the problems in ETE and build relevant models; from that calculate, design, build ETE systems.
2. Solve problems through the calculation, design and construction of systems in combination with the use of specialized software in ETE field.
3. Express, present, explain clearly complex issues and alternative solving in ETE field.
4. Work effectively in different roles including organization, management, operation, design, implement; engage in life-long learning.
5. Meet fully the requirements of learning and research based on foreign languages according to the regulations of the Ministry of Education and Training and UD-DUT.
6. Have consistently political qualities, awareness of civic responsibility, awareness of discipline and awareness of community.

1.6. Program Learning Outcomes (PLOs):

After graduating from the program, students should have:

1. An ability to apply knowledge of science in working.
2. An ability to apply knowledge of Electronic and Telecommunication (ET) fundamentals and specializations in working, use technical methods, modern engineering tools, and specialized softwares in engineering practice.
3. An ability to design and conduct experiments, analyze and interpret data; to identify, formulate and solve Electronic and Telecommunication engineering problems.
4. An ability to think independently, critically, and work in team effectively.
5. An ability to express and present clearly the engineering problems that have to solve and the achieved results.

6. An ability to acquire new knowledge, update information in order to meet the requirements of rapid development of the ETE field and an ability to engage in life-long learning.
7. The broad education necessary to understand the impact of engineering solutions in an environmental and societal context.
8. An ability to communicate in foreign language in working.

1.7. Mapping Program Objectives (POs) and Program Learning Outcomes (PLOs)

Program Objectives **(POs)**	**Program Learning Outcomes (PLOs)**							
	1	2	3	4	5	6	7	8
1	x	x	x					
2	x	x	x					x
3	x	x	x		x			
4				x		x	x	
5			x	x	x	x		x
6				x			x	

1.8. Requirement foreign language competence:

Graduates have foreign language proficiency level of 3 according to the "National Language Competence Scale of 6 levels" regulated by the Ministry of Education and Training.

1.9. Job placements can be taken after graduation

After graduation, the engineers of the ETE can work on following job:

1. Consulting, calculating, designing, exploiting, operating, maintaining systems at enterprises/industry in ETE field.
2. Working in management offices and enterprises related to ETE field.
3. Teaching courses in ETE field at universities, colleges, vocational schools and high schools.
4. Scientific research in ETE field at research institutes, research centers, universities and colleges.

1.10. Entrance requirements for candidates

- Candidate are eligible for entrance examination and direct choice according to the current regulations of the Ministry of Education and Training.

- Entrance Examination: Blocks A and A1.

1.11. Education process, course evaluation, graduation conditions

Organizing education, examinating and assessment courses and considering graduation conditions following the current education regulations ("Regulation on full time undergrade according to the credit-based system", Decision No. 564 / ĐHBK-ĐT / 2013 issued by the Rector on May 13rd , 2013).

The full-course training plan and the school-year plan shall be prescribed by the Rector.

2. Teaching-learning strategies and student assessment methods

2.1. Requirements when implementing education program

2.1.1. Preparatory work for teaching

Before teaching, faculty members need to do a variety of preparatory work. The preparation includes not only the design or revision of the course, but also includes: i) understand clearly the type of the course (eg, fundamentals, theory or practice) (ii) determine the form of teaching (theoretical teaching, presentation or implementation of projects), (iii) understand students' proficiency, (iv) understand deeply the rules and regulations (v) master the program's expected learning outcomes, and (vi) coordinate closely beween the instructor in charge of the theoretical and practical courses.

2.1.2. Design lesson for the course

Instructors need to clearly determine contents to teach students; identify effective methods to assess students' academic performance, build activity plan, exercises and learning materials.

Classes are divided in different ways (by student number, course type and student level). Classes vary from year to year. Faculty members should be based on the actual classroom to adjust structure, exercises, and activities to best students’ support. The objective of this activity is to create a good learning environment that assists students in achieving the objectives of the course.

Instructors who are in charge of theoretical and practical courses need close coordination and cooperation. Especially when arranging issues related to the course, such as module content, module implementation plan and student relationship.

2.1.3. Put students at the center

The student-centered education program aims to increase students' attention and concentration, promoting the practice of thinking and critical thinking skills. Lecturers need to identify clearly course objectives and strategies for evaluating performance. It is also important to identify channels to receive useful feedback from students to improve the course.

Students are required to attend a positive study, not just sitting and listening. Activities may include short questions and answers, incorporating discussion in the lecture, classroom exercises, hands-on activities, and group activities.

Lecturers apply technology in teaching, especially as these tools are suitable with the learning objectives of the instructor and the content of the course.

2.1.4. Activities to support students

Students can meet lecturer outside the classroom or exchange information through communication mean such as Email, Facebook, etc. for in-depth questions and discuss unresolved issues in the classroom. In addition, lecturer need to publish student-meeting schedules to assist students in their academic success.

2.2. Teaching-learning strategies

2.2.1. Activity-based strategies

Organize individual or team activities to develop targeted communication skills, make project planning, capture problem from questions, analysis and create product. The method can be applied to students in the classroom, or in the library, or in enterprises, or in the natural environment. Provide students with the ability to create plans and steps as well as the ability to describe the results. Common strategies in this group are student-centered discussions, group work, presentations, etc.

2.2.2. Arts-Based Strategies

Arts-based instructional strategies are strategies that try to improve learner achievement by engaging learners in a variety of forms, sounds, and images. These strategies can be used throughout the curriculum and emphasize the creative process and especially emphasize the product or performance.

2.2.3. Cooperative Strategies

For students and lecturers (for example, for students, they create groups to work together, for lecturers, they work in team in the design of course syllabus, assessment of students, etc.).). There are five basic elements of this strategy including collective

thinking, mutual encouragement; individual contribution to team success, small team and individual skills, team development. Common strategies in this group include creating learning groups, creating learning communities, controlling group conflicts, and so on.

2.2.4. Direct-Instruction Strategies

Direct teaching is a form of lecturing, passing knowledge in the way that teacher educate and students listening. It is often applied to traditional classes or special applications where other strategies fail when applied. However, it should be balanced between this strategy and another. This strategy is effective when it is necessary to present some basic information, explain a new skill, or teach directly to the learner at the beginning. Common strategies are applied such as reviewing, showing new lessons, presentation, practice (with or without instructions), etc.

2.2.5. Information technology-Based Strategies

To use modern information technology equipment to create, edit and propagate lecture content such as graphic applications, software-based simulation application…to achieve the objectives of the course.

2.2.6. Independent Learning Strategies

It helps students develop the ability to take responsibility for learning and understand how to self-study. This strategy is shown in the fact that reports, articles, ... have to express clearly the standards and independence of thought and structure. Common strategies include homework, self-study content, memorization, recording, research, reports, etc.

2.2.7. Inquiry-based strategies

Students can learn through asking questions to lecturer to investigate or research a subject, an idea, or a problem. Common strategies are applied such as modeling, cognitive skills, computational skills, etc.

2.2.8. Thinking skill strategies

To help students develop the ability to review an idea, analyze a vision, solve a problem, and make decisions.

2.3. Evaluation and improvement of teaching methods

Evaluation and improvement of teaching methods need to conduct regularly based on the results of multiple reflective channels (self-assessment, student feedback and peer review).

2.3.1. Assessment of teaching work

Lecturers need to monitor their teaching as the exercises, tests and classroom plans. This will allow the lecturer to have the basis for the addition or removing of the content of the course. The report of teaching at the end of semester also gives lecturers an overview of teaching and is a source of information for improved versions of the course.

Feedback from students is also a valuable source of information for evaluating lecturers. There are many ways to collect feedback from students: online and direct surveys, email and open discussions ... which method is best, depends on the teacher's assessment objectives and the type of information to be collected. .

In addition, peer evaluation from other trainers is also effective in gaining more views on teaching and learning.

2.3.2. Improved teaching methods

Seminars and workshops on teaching to provide systematic information to improve teaching methods. At the UD-DUT, such seminars and workshops are constantly being organized to ensure that all faculty members are able to participate and access advanced and effective teaching methods. .

2.4. Student assessment methods

Student assessment aims to provide students with feedback on their academic results. Assessment methods should classify students by using clear classification criteria and annouce these criteria to students.

Assessment of student learning results may include formal or informal assessments, individual or group, including assessment of knowledge and personal skills and communication, skills of operating production and building systems.

2.4.1. Methodology of informal assessment

Informal assessment methods can be used such as classroom questioning, small-scale activities at the end of a lesson, or self-study questions. These activities are designed to help students recognize the most important aspects of the lesson, which students do not understood yet and help students develop their own self-monitoring skills so that they can make the right adjustments.

2.4.2. Formal assessment

Formal assessment methods such as group work, reports, presentations, ... are supervised by faculty members and help students who have difficulty or go astray. Lecturers can then adjust their instruction to suit the needs of their students. In team

activities, it is important to appreciate the contributions and responsibilities of the team members. At the same time, students are asked to think about more complex issues. This will help students develop teamwork skills, time management skills, and problem solving skills.

2.4.3. Review summary

A summative assessment is conducted in the middle and end of the course to measure the achievement of the student's expected learning results.

2.4.3.1. Exams

There are midterm exam in the middle of the semester and final exam at the end of the semester. The exams are in the form of self-reports and are implemented in some types of questions such as: short answers, multiple choice answers, and short essay. The exam may be assigned in the form of a topic, for which students are asked to find out about some problem within the scope of the course, then they have to write a report and present their findings. The main purpose is to allow students to fully demonstrate their knowledge about the course.

2.4.3.2. Projects and Presentation

This assessment type gives students the opportunity to gain deeper understandings of the materials and learning resources related to the course. Students are normally divided into groups, each group will study about a problem related to the course, write a report, and present their findings. In addition to knowledge gained throughout the project-based learning process, students can have opportunities to express their personal skills as well as communication skills.

2.4.3.3. Graduation Project

The graduation project requires the student or a group of students to synthesize all the knowledge they have learned in order to carry out an specific topic under the guidance of instructors/lecturers. Graduation projects can be conducted at the university or in cooperation with companies (Capstone Project) to identify and solve practical problems that are of interest to companies.

2.5. Assessment Rubrics

2.5.1. General Assessment Rubrics

Assessment Areas	Level of Accomplishment			
	Need Improvement (1)	**Developing (2)**	**Sufficient (3)**	**Above Sufficient (4)**
Teamworking	There is obvious assignment on member's role but not clear task distribution, no connected deliverables.	Obvious roles of members, clear task distribution to each member, not clear deliverables.	Clear assignment on member's roles associated with suitable tasks and deliverables.	Clear assignment on member's roles associated with suitable tasks and deliverables, well-defined timing for each deliverables.
Design and Implementation	The purpose of the work is not well-defined. Main ideas are not focused to support the project. Thoughts appear disconnected.	The main purpose of the work is identified. Ideas are generally focused in a way that supports the project.	The main purpose of the work is clear and ideas are almost always focused in a way that supports the project. Relevant details illustrate the author's ideas.	The central purpose of the work is clear and supporting ideas always are always well-focused. Details are relevant and enrich the work.
Technical report writing	Information and ideas are poorly sequenced. The	Information and ideas are presented in an order that	Information and ideas are presented in a logical	Information and ideas are presented in a logical

Assessment Areas	Level of Accomplishment			
	Need Improvement (1)	**Developing (2)**	**Sufficient (3)**	**Above Sufficient (4)**
Presentation	audience has difficulty following the thread of thought.	the audience can follow with minimum difficulty.	sequence which is followed by the reader with little or no difficulty.	sequence which flows naturally and is engaging to the audience.

2.5.2. Rubrics for Project Assessment

Assessment Objectives	Level of Accomplishment			
	Need Improvement (1)	**Developing (2)**	**Sufficient (3)**	**Above Sufficient (4)**
General Objectives of Project	Project objectives are not defined; Main proposed solutions do not support problem solving; The proposed structure is not seamless.	Project objectives are defined; Main proposed solutions support the problem to be solved; The proposed structure has a connection.	Project objectives are clearly defined; The main proposed solutions are appropriate to solve the problem; The proposed structure is coherently linked.	Project objectives are clearly defined; The main proposed solutions are appropriate and modern to solve the problem; The proposed structure is coherently linked in detail.
Knowledge	Have uncertain understanding of basic knowledge; Incorrect use of basic	Understand and apply the basic knowledge of the relevant fields to solve the problem.	Understand and apply basic knowledge along with complex technical	Master basic knowledge, apply well complex technical solutions, have creative

Assessment Objectives	Level of Accomplishment			
	Need Improvement (1)	**Developing (2)**	**Sufficient (3)**	**Above Sufficient (4)**
	knowledge to solve problems.		solutions to problem solving; Ability to analyze problems, evaluate results and make comments for improvement.	proposals to solve problems more effectively; Have detailed problem analysis skills, evaluate and compare results; Detailed suggestions for improvement.
Organization, Presentation	Information is not structured. Readers are hard to follow and understand the main content of the report. Discrete presentation and the explanation does not convince listeners.	Information is structured. Readers can monitor and understand the content of the report to a minimum extend. The presentation has a basic structure, the explanation persuades the listener to some minimum extend.	Information is logically structured. Readers understand all the main contents of the report. The presentation has a reasonable structure, the explanation is convincing the listener.	Information is structured and creative. Readers understand main contents of the report and are capable of repeating the tasks described in the report in a relative manner. The presentation is reasonably structured and lively to convince listeners. Most explanations

Assessment Objectives	Level of Accomplishment			
	Need Improvement (1)	**Developing (2)**	**Sufficient (3)**	**Above Sufficient (4)**
				answer the questions of the listener.

2.5.3. Rubrics for Essay and Report Assessments

Assessment Objectives	Level of Accomplishment			
	Need Improvement (1)	**Developing (2)**	**Sufficient (3)**	**Above Sufficient (4)**
Structure	The writing is lack of logic and lack of consistency; there are many errors.	The writing is coherent and generally well organized. Some points are misplaced and deviated from the topic. Transitions are not well made.	The writing is coherent and streamlined, segmented. There is a consistency in the content.	The writing is conherent and logical in expressing the views, with the highest consistency.
Contents	The writing presents some views and arguments but the ideas are not fully developed and not unique.	The writing expresses some views, arguments and some creative ideas.	The writing expresses creative ideas, the views are fully developed with solid basis.	The writing expresses ideas that are carefully analyzed with creative arguments and solid evidences supporting the topic.

Idea Developing	The main idea of the writing is not fully developed. The ideas in the writing are vague, lack of argument, lack of critical thinking.	The main idea of the writing is limitedly developed in detailed. Some reflects critical thinking.	The main idea of the writing is well developed, the content is sufficient and meaningful. Critical thinking is included in the arguments.	The main idea of the writing is well developed, the content is more detailed and quality. Critical thinking is expressed in a very good way
Grammar, Presentation	Spelling, punctuation and grammatical errors cause distraction and confusion for readers. Many typos exist.	Spelling, grammar, and punctuation are still common, but readers still understand the content of the writing. There are also typos.	The writing has some spelling, punctuation, grammar errors but readers still understand the content clearly. Very few typos.	No spelling mistakes, no punctuation or grammatical errors; no typos.
Writing Style	Only using simple sentence structures, little words, poor tone.	Nearly achieved the level of use of sentence structure, vocabulary, rhetoric tone.	Reaching the writing style of the higher education level. Proper tone and rhetoric are used to highlight the content; diversity structures and impressive.	Expressing outstanding academic excellence beyond the writing style of the higher education level; rhetoric and tone are used very impressly; Use and combine creative sentence structures.

2.5.4. Rubrics for Presentation/Oral Communication Assessments

Assessment Objectives	Level of Accomplishment			
	Need Improvement (1)	**Developing (2)**	**Sufficient (3)**	**Above Sufficient (4)**
Presentation	Have less eye contact, just look and read the document. Weak speaking.	Have eye contact but still look at the document. Weak speaking.	Have eye contact, occasionally look at the document. Speaking clearly, changing presentation styles.	Attract the listener's attention by using eye contact, rarely looking at the material. Speak clearly, hit the right time, emphasize the main idea.
Content and Organization of Report	Have no knowledge and sketchy questions about the topic. The object and purpose is unclear; Provide weak support or; Provide insufficient data, evidence for ideas or conclusions.	Have little knowledge and sketchy questions about the topic. The object and purpose is unclear; Provide weak support or insufficient data, evidence for ideas or conclusions.	Knowledgeable, answer all the questions without explaining in detail. Showing a clear purpose and theme; There are examples and supporting statistics; There are some data or evidence supporting the conclusion.	Demonstrate full knowledge by answering clearly, specifically all uestions. Provide a clear purpose and theme; Have adequate, appropriate examples and statistics; Have sufficient data, opinions, supporting evidence conclusions.
Enthusiasm in presentation,	Concerned about the topic	Less or mixed emotion on the	Shows some emotional	Show strong enthusiasm on the topic

awareness and knowledge of presenter	presented in a limited way	topic presented.	enthusiasm on the topic.	throughout the presentation.

2.5.5. Grade Mapping

Classification		Scale 10	Scale 4	Scale letter
Pass	Above Sufficient	4	8,5 - 10	A
	Sufficient	3	7,0 - 8,4	B
	Developing	2	5,5 - 6,9	C
	Need Improvement	1	4,0 - 5,4	D
Fail	Not meet requirement	0	< 4,0	F

3. Places for Program Implementation

- Lectures, Exercises, Discussion, Lab, Tutorials are taken place at University (lecture rooms, lecture halls, labs, library, self-study areas).
- Field trip and internship activities are taken place in the practice field of the University or in Companies working in the areas of Electronic, Telecommunication and Computer Engineering.

4. Content and structure of the education program

4.1. Program structure

The education program is structured into a complete system, a reasonable distribution in term of time, a balance guarantee among amount of time of theoretical, practical and internship in order to meet the requirements and education objectives.

The education program includes general education and specialized education knowledge. The program is evaluated and adjusted periodically to ensure education quality and suitable with reality.

4.2. The Mapping between knowledge clusters and program ELOs

Knowledge area		Credits (%)	Programme Learning Outcome (PLOs)							
			1	2	3	4	5	6	7	8
General Education knowledge area	General Education	38.5 (25.3%)	H	H			H	L	H	H
	Math & Science	26 (17.1%)	H	H		L				
Fundamentals and specializations knowledge	Engineering Fundamentals	40 (26.3%)	H	H	H	L	H	H		
	Mandatory Engineering Specializations	27.5 (18.1%)	H	H	H	L	L	H	L	L
	Selective Engineering Specializations	10 (6.6%)	H	H	H	H	L	H	L	L
	Graduate Project	10 (6.6%)	H	H	H	H	H	H	L	L
Total		**152**								

Note: H: High; L: Low; Empty: Not related

4.3. List of the mapping among courses and PLOs

STT	Course	Number of credits	PLO							
			1	2	3	4	5	6	7	8
1	English A	3						L		H
2	English B	4						L		H
3	Specialized English (ETE)	2						L		H
4	Semiconductor Devices	3	H	H	H	L	L	H		
5	Data Structure	2	H	H	H		L	H		
6	Selected topics in Electronic Engineering	2	H	H	H	L		L	L	H
7	Selected topics in Computer Engineering	2	H	H	H	L		L	L	H
8	Selected topics in Telecommunication Engineering	2	H	L	H	L		L	L	H
9	Software Technology	2	H	H	H	L		L		
10	Microelectronic Technology	2	H	H	H	L	L	H		
11	Algebra	3	H	H				H		
12	Electronic Communications	2	H	H	H	L		H		
13	Applied Electronics	2	H	H	H	H	L	H		
14	Medical Electronics	2	H	H	H	L	L	H		

STT	Course	Number of credits	PLO							
			1	2	3	4	5	6	7	8
15	Logic Control	2	H	H	H	L	L	H	L	
16	Electronic Engineering Project	2	H	H	H	H	H	H	L	L
17	Telecommunication Project	2	H	H	H	H	H	H	L	L
18	Computer Engineering Project	2	H	H	H	H	H	H	L	L
19	Electronic Communications Project	2	H	H	H	L	H	H		
20	Electronic Circuit Engineering Project	2	H	H	H	L	L	H		
21	Graduation Project (Electronics)	10	H	H	H	H	H	H	L	H
22	Graduation Internship (Computer)	10	H	H	H	H	H	H	L	H
23	Graduation Project (Telecommunications)	10	H	H	H	H	H	H	L	H
24	Electronic Measurement	2	H	H	H	L	L	H		
25	The revolutionary line of the Vietnamese Communist Party	3						L	H	
26	Analytics 1	4	H	H				L		
27	Analytics 2	4	H	H				L		
28	Graphics Geometry	2	H	H				L		
29	General chemistry	2	H	H				L		
30	Computer Architecture and Design	2		H	H	L	L	H		L
31	Management Economic	2	H	H				L	H	
32	Antenna Engineering	2	H	H	H	L		H		
33	Switching Engineering	2	H	H	H	L		H		
34	Multimedia Communications	2	H	H	H	L	L	H		
35	Electronic Engineering	2	H	H				L		
36	Telephone Engineering	2	H	H	H	L		H		
37	Computer Programming	2	H	H	H	L		H		
38	Electronic Circuit Engineering 1	3	H	H	H	L		H		
39	Electronic Circuit Engineering 2	3	H	H	H	L		H		
40	Heating Engineering	2	H	H				L		
41	Microwave Engineering	2	H	H	H	L		H		
42	Digital Circuits and Systems	3	H	H	H	L		H		
43	Television Engineering	2	H	H	H	L	L	H	L	
44	Microcontroller	2	H	H	H	L	L	H		
45	Microprocessor	3	H	H	H	L	L	H		
46	Digital and Pulse Engineering	2	H	H	H	L	L	H		

STT	Course	Number of credits	PLO							
			1	2	3	4	5	6	7	8
47	Electronic Circuit Theory 1	3	H	H	H	L		H		
48	Electronic Circuit Theory 2	3	H	H	H	L		H		
49	Information Theory	2	H	H	H	L	L	H		
50	Computer Communication Networks	2	H	H	L	L	L	H		
51	Environment	2	H	H				L	H	
52	Introduction to Engineering	2	H	H	L	H	H	L		
53	Basic Principles of Marxism Leninism 1	2						L	H	
54	Basic Principles of Marxism Leninism 2	3						L	H	
55	General law	2	H	H				L	H	
56	Calculation method	3	H	H				T	T	
57	Digital Filter Design	2	H	H	H	L		H		
58	Embedded Systems Design	2		H	H	L	L	H		
59	Mobile Communication	2	H	H	H	L	L	H	L	L
60	Digital Communication	2	H	H	H	L	L	H		
61	Fiber Optic Communications	2	H	H	H	L	L	H	L	L
62	Microwave-Satellite Communications	2	H	H	H	L	L	H	L	L
63	General Information Lab	1	H	H				L		
64	Working Practice (Electronics)	2.5	H	H	H		L			
65	Working Practice (Computer)	2.5	H	H	H	L	L	L		
66	Working Practice (Telecommunication)	2.5	H	H	H	L	L	L	L	
67	Graduation Internship (Electronics)	2	H	H	H	L	L	L	L	L
68	Graduation Internship (Computer)	2	H	H	H	L	L	L	L	L
69	Graduation Internship (Telecommunications)	2	H	H	H	L	L	L	L	L
70	Signals and systems	3	H	H	H	L	H	H		
71	General Information	2	H	H				L		
72	Computer Programming Lab	1	H	H		L	H	H		
73	Semiconductor Devices Lab	1	H	H		L	H	H		
74	Applied Electronics Lab	1	H	H	H	L	L	H		
75	Logic Control Lab	1	H	H	H	L	L	H		
76	Electronic Measurement Lab	1	H	H		L	H	H		
77	Antenna Engineering Lab	1	H	H	H	L	L	H		
78	Electronic engineering lab	0.5	H	H		L		L		

STT	Course	Number of credits	PLO							
			1	2	3	4	5	6	7	8
79	Electronic Circuit Engineering Lab	1	H	H	H	L	L	H		
80	Digital Electronic Design Lab	1	H	H		L	L	H		
81	Pulse Engineering Lab	1	H	H		L	L	H		
82	Electronic Circuit Theory Lab	1	H	H	L	L	H	H		
83	Microcontroller Lab	1	H	H		L	L	H		
84	Microprocessor lab	1	H	H		L	L	H		
85	Computer Communication Networks Lab	1	H	H		L	H	H		
86	Microwave Engineering Lab	1	H	H	H	L	L	H		
87	Signals and Systems lab	1	H	H		L	L	H		
88	Digital Filter Design Lab	1	H	H		L	L	H		
89	Communication System Lab	1	H	H	H	L	L	H		
90	Physic Lab	1	H	H		L		L		
91	Computer Organization	3	H	H	L	L	L	H		
92	Specialized Maths	3	H	H		L		H		
93	Electromagnetic Field	3	H	H	H	L		H		
94	Data Communications	2	H	H	H	L	L	H		
95	Radio Wave Propagation	2	H	H	H	L		H		
96	Ho Chi Minh's Thought	2						H		
97	Physics 1	3	H	H				L		
98	Physics 2	3	H	H				L		
99	Technical drawing	2	H	H				L		
100	Probability statistics	3	H	H				L		
101	Digital Image Processing	2	H	H	H	L		H		
102	Digital Signal Processing	3	H	H	H	L		H		

Note*: T: High; L: Low; Empty: Not related*

4.4. Tentative learning schedule

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
Semester 1		**18**	**1**				
2090131	The basic principles of Marxism and Leninism 1	2					
1080011	Graphic geometry	2					

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
4130241	English A	3				Achieves A1 or passing the entrance qualification exam	
3190111	Analytics 1	4					
3050011	Physics 1	3					
1020691	General information	2					
1020701	General information practice		1				General information
	General law	2					
130011	Physical education 1						
Semester 2		**17**	**1**				
2090141	The basic principles of Mac-Leninism 2	3				The basic principles of Mac-Leninism 1	
3190121	Analysis 2	4				Analysis 1	
3190131	Algebra	3				Analysis 1	
3050641	Physics 2	3				Physics 1	
3050651	Physics lab		1				Physics 2
4130311	English B	4				English A	
130021	Physical education 2						
Semester 3		**16**	**2**				
2090101	Ho Chi Minh's Thought	2				The basic principles of Mac-Leninism 2	
1061162	Introduction to Engineering	1	1				
3190041	Probability statistics	3				Analysis 2	
1080401	Technical drawing	2				Graphics	
1040451	Heat engineering	2				Physics 2	
1060013	Semiconductor Devices	3				Physics 2, Analysis 2	

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1060033	Semiconductor Devices Lab		1				Semiconductor Devices
1060023	Electronic Circuit Theory 1	3				Analysis 2, Algebra	
130031	Physical education 3						
Semester 4		**16**	**1.5**				
2090121	Revolutionary Way of the Communist Party of Vietnam	3				The basic principles of Marxism-Leninism 2	
3060303	General Chemistry	2					
1061170	Advanced Mathermatics for Electronic Engineering	3				Analysis 2, Algebra	
1060043	Electronic Circuit Theory 2	3				Electronic Circuit Theory 1	
1060113	Electronic Circuit Theory Lab		1				Electronic Circuit Theory 2
1060742	Electronic Circuit Engineering 1	3				Electronic Circuit Theory 1, Semiconductor Devices	
1050931	Electronic Engineering	2				Algebra, Analysis 2, Physics 2	
1050921	Electronic Engineering Lab		0.5				Electronic Engineering
130041	Physical Education 4						
Semester 5		**14**	**4**				
1061220	Computer Programming	2				General information	

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1060193	Computer Programming Lab		1				Computer Programming
1060063	Electromagnetic Field	3				Mathematics for Electronics and Telecommunications, Physiscs 2	
1061180	Digital Circuits and Systems	3				Semiconductor Devices	
1060103	Digital Electronic Design Lab		1				Digital Electronic Design
1060752	Electronic Circuit Engineering 2	3				Electronic Circuit Engineering 1	
1060972	Electronic Circuit Engineering Lab		1				Electronic Circuit Engineering 2
1061190	Signals and Systems	3				Electronic Circuit Theory 2	
1061200	Signals and Systems Lab		1				Signals and Systems
130051	Physical education 5						
Semester 6							
Common courses for 3 Electronic, Telecommunication, and Computer Engineering		**10**					
1061210	Calculation method	3				Algebra, Analysis 2	
1061230	Computer Organization	3				Digital Circuits and Systems, Computer Programming	

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1061260	Digital Communications	2				Signals and Systems	
4130330	Specialized English ETE	2				English B	
Telecommunication Engineering		***6***	***1***				
1061330	Microwave Engineering	2				Electromagnetic Field	
1060793	Microwave Engineering Lab		1				Microwave Engineering
1061240	Electronic Communications	2				Electronic Circuit Engineering 2	
1061250	Information Theory	2				Probability statistics	
Electronic Engineering		***4***	***2***	***2***			
1060133	Pulse Engineering	2				Semiconductor Devices, Electronic Circuit Theory 1	
1060283	Pulse Engineering Lab		1				Pulse Engineering
1060852	Electronic Circuit Engineering Project			2		Electronic Circuit Engineering 1	
1061280	Electronic Measurement	2				Semiconductor Devices	
1061043	Electronic Measurement Lab		1				Electronic Measurement
Computer Engineering		***5***		***2***			
1060223	Data Structure	2				Computer Programming	
1060323	Digital Signal Processing	3				Signals and Systems	

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1060852	Electronic Circuit Engineering Project			2		Electronic Circuit Engineering 1	
Semester 7							
Common courses for 3 Electronic, Telecommunication, and Computer Engineering		**2**					
1170011	Environment	2					
Telecommunication Engineering		***10***	***4.5***	***2***			
1061320	Television Engineering	2				Electronic Communications	
1061340	Communication System Lab		1			Digital Communications	
1060763	Mobile Communications	2				Digital Communication	
1060333	Radio Wave Propagation	2				Electromagnetic Field	Antenna Engineering
1060543	Antenna Engineering	2				Electromagnetic Field, Advanced Mathermatics for Electronic Engineering	
1061270	Antenna Engineering Lab		1				Antenna Engineering
1060353	Computer Communication Networks	2				Computer Organization	
1060983	Electronic Communications Project			2		Electronic Communications	

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1061290	Working Practice (Telecommunications)		2.5			Electronic Communications	
Electronic Engineering		***10***	***5.5***				
1060473	Microelectronic Technology	2				Digital Circuits and Systems	
1061300	Working Practice (Electronics)		2.5			Digital Circuits and Systems, Electronic Circuit Engineering 2	
1061240	Electronic Communications	2				Digital Circuits and Systems, Electronic Circuit Engineering 2	
1060822	Applied Electronics	2				Pulse Engineering, Digital Circuits and Systems	
1061503	Applied Electronics Lab		1				Applied Electronics
1060832	Microcontroller	2				Digital Circuits and Systems, Computer Programming	
1060383	Microcontroller Lab		1				Microcontroller
1060503	Logic Control	2				Digital Circuits and Systems	
1061053	Logic Control Lab		1				Logic Control
Computer Engineering		**11**	**5.5**				
1061463	Microprocessor Lab		1				Microprocessor

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1061310	Working Practice (Computer)		2.5			Electronic Circuit Engineering 1	
1060162	Microprocessor	3				Computer Organization	
1060353	Computer Communication Networks	2				Computer Organization	
1060653	Multimedia Communications	2				Digital Signal Processing	Digital Filter Design
1060403	Data Communications	2				Signals and Systems	
1061350	Digital Filter Design	2				Digital Signal Processing	
1061360	Digital Filter Design Lab		1				Digital Filter Design
1061380	Computer Communication Networks Lab		1				Computer Communication Networks
Semester 8		**12**	**2**	**2**			
Common courses for 3 Electronic, Telecommunication, and Computer Engineering		**2**					
1180332	Economic management	2					
Telecommunication Engineering		**10**	**2**	**2**			

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1061420	Telecommunication Project			2		All theoretical, experimental courses, practice, Lab of previous semesters	
1061390	Graduation Internship		2			All theoretical, experimental course, practice, Lab of previous semesters	
10 credits selectives among the course below for Telecommunication Engineering							
1060803	Selected topics in Telecommunication Engineering	2				Digital Communications	
1060553	Fiber Optic Communications	2				Electronic Communications, Digital Communications	
1060563	Switching Engineering	2				Digital Communications	
1060473	Microelectronic Technology	2				Digital Communications	
1061580	Telecommunication Networks	2				Mobile Communications	
1061590	Random Signal Processing	2				Signals and Systems	
1060573	Microwave-Satellite Communications	2				Radio Wave Propagation, Electronic Communications, Antenna Engineering	

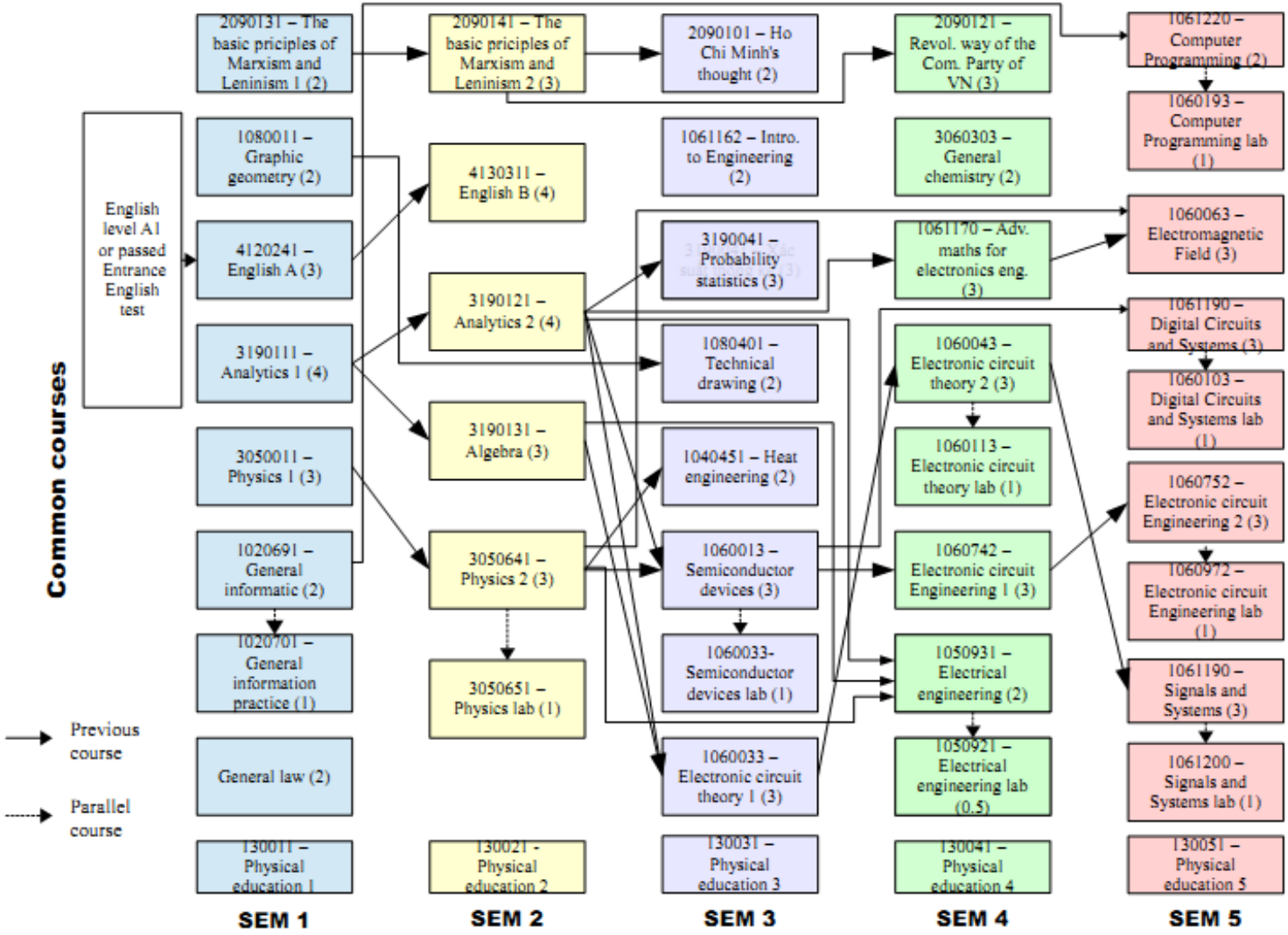
Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1061600	Microwave System Design	2				Microwave Engineering, Antenna Engineering	
1061610	Analog Integrated Circuit Design	2				Electronic Circuit Engineering 1	
1061620	Wireless Sensor Networks	2				Digital Communications	
1061630	Digital Integrated Circuit Design	2				Digital Circuits and System	
Electronic Engineering		**10**	**2**	**2**			
1061430	Electronic Engineering Project			2		Applied electronics, Microcontroller	
1061400	Graduation Internship		2		Implement in semester 8		
10 credits selectives among the course below for Electronic Engineering							
1060513	Selected topics in Computer Engineering	2			Occur in semester 8		
1060493	Medical Electronics	2				Digital Circuits and Systems	
1061630	Digital Integrated Circuit Design	2				Microelectronic Technology, Digital Circuits and Systems	
1061640	Embedded Systems Design	2				Computer Organization, Computer Programming	
1060553	Fiber Optic Communications	2				Electronic Communications, Digital Communications	

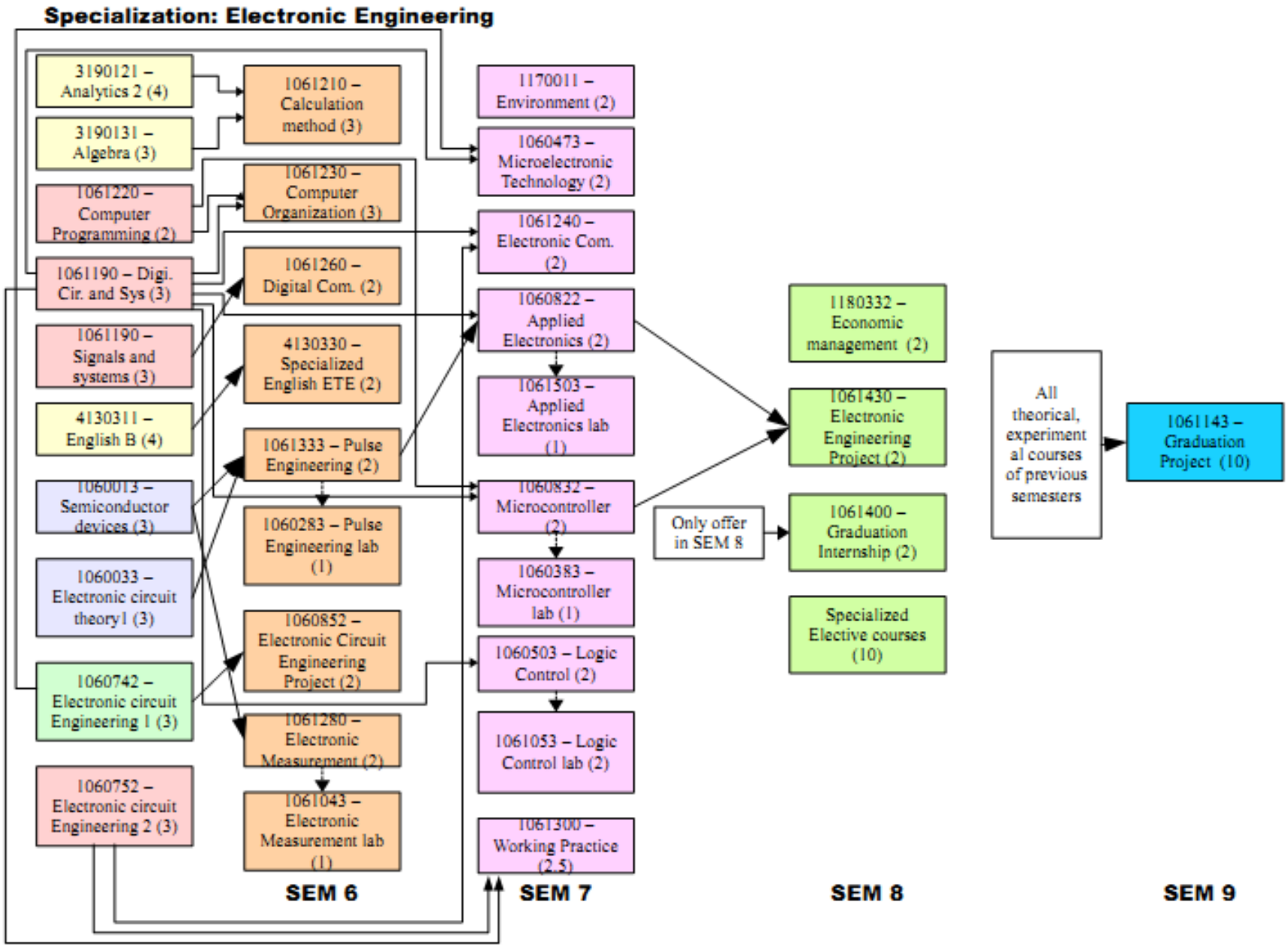
Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1061610	Analog Integrated Circuit Design	2				Microelectronic Technology, Electronic Circuit Engineering 1	
1060783	Ultrasonic Engineering	2				Pulse Engineering, Digital Circuits and Systems	
1061650	Biosensors	2				Electronic Circuit Engineering 1	
1060763	Mobile Communications	2				Digital Communications	
1061660	Robotics	2				Digital Circuits and System	
1061670	Control Techniques	2				Electronic Circuit Engineering 1	
1061680	Sensors and Measurement	2				Electronic Measurement	
1061370	Digital Image Processing	2				Signals and Systems	
1060583	Telephone Engineering	2				Computer Organization, Digital Circuits and Systems, Computer Programming	
1061450	Architecture and computer design	2				Computer Organization	
1060353	Computer Communication Networks	2				Computer Organization	
Computer Engineering		***10***	***2***	***2***			

Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1061410	Graduation Internship			2	Occur in semester 8		
1061440	Microprocessor and Computer Organization Project		2			Microprocessor	
10 credits selectives among the course below for Computer Engineering							
1060763	Mobile Communications	2				Digital Communications	
1060473	Microelectronic Technology	2				Digital Circuits and Systems	
1061640	Embedded Systems Design	2				Computer Organization, Computer Programming	
1061620	Wireless Sensor Networks	2				Digital Communications	
1060663	Selected topics in Computer Engineering	2				Computer Programming	
1060553	Fiber Optic Communications	2				Electronic Communications, Digital Communications	
1060493	Medical Electronics	2				Digital Circuits and Systems	
1060613	Operating Systems	2				Computer Organization	
1061450	Architecture and computer design	2				Computer Organization	
1061370	Digital Image Processing	2				Signals and Systems	
1061680	Sensors and Measurement	2				Electronic Measurement	
1061690	Speech Processing	2				Digital Signal Processing	

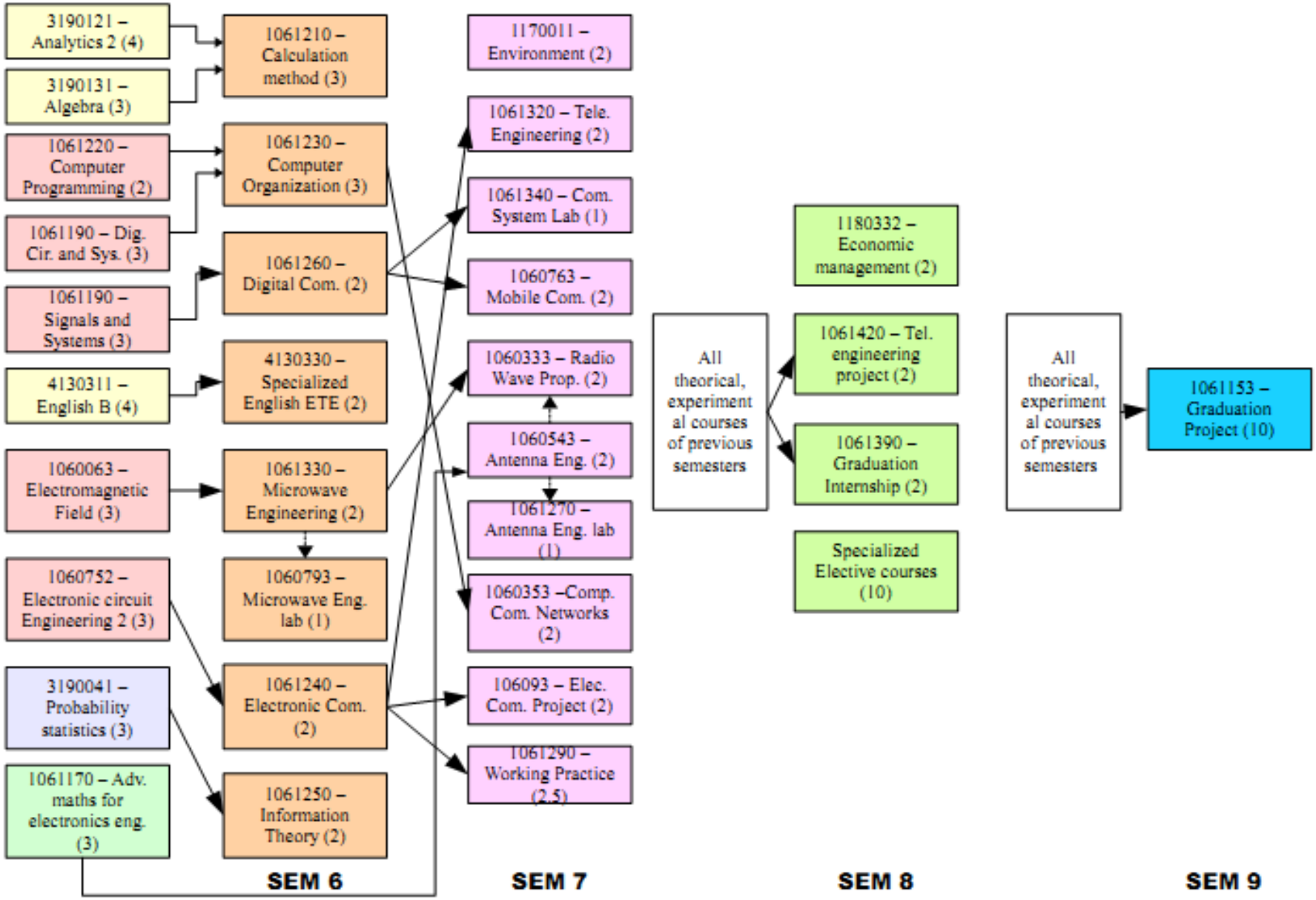
Course Mark	Course	Number of credits			Condition		
		Theory	Experiment / Project	Practice	Prerequisite	Previous Course	Parallel Course
1060633	Software Engineering	2				Computer Organization	
1061700	Compilers	2				Computer Programming	
1061660	Robotics	2				Signals and Systems	
1061710	Pattern Recognition	2				Digital Signal Processing	
1061590	Random Signal Processing	2				Signals and Systems	
1061720	Spectral Analysis	2				Digital Communications	
Semester 9				**10**			
1061153	Graduation Project (Communications)			10	All theoretical, experimental courses, practice, Lab of previous semesters		
1061143	Graduation Project (Electronics)			10	All theoretical, experimental courses, practice, Lab of previous semesters		
1061133	Graduation Project (Computer)			10	All theoretical, experimental courses, practice, Lab of previous semesters		

5. Curriculum roadmap

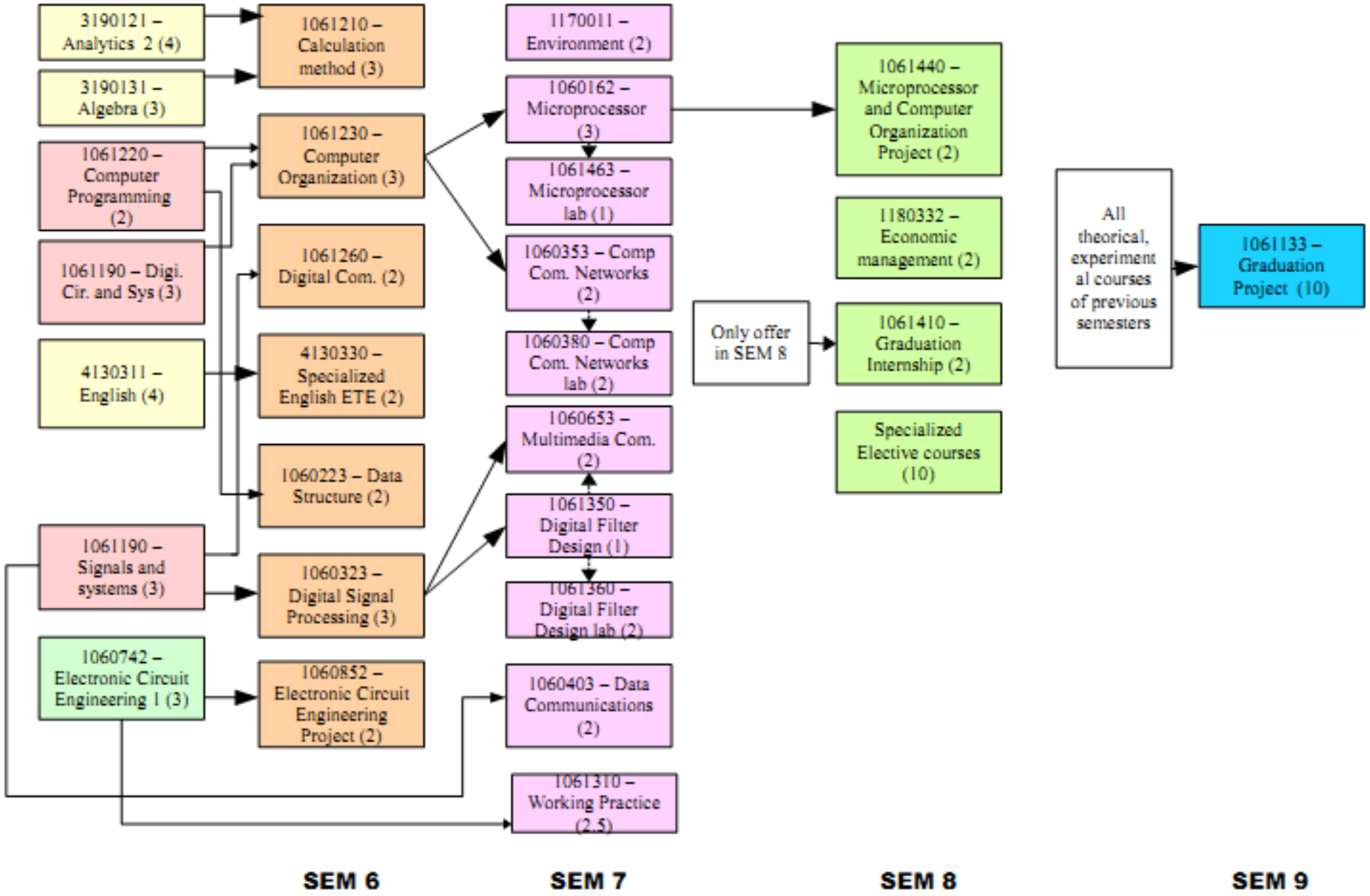



Specialization: Electronic Engineering
3190121 – Analytics 2 (4)
3190131 – Algebra (3)
1061220 – Computer Programming (2)
1061190 – Digi. Cir. and Sys (3)
1061190 – Signals and systems (3)
4130311 – English B (4)
1060013 – Semiconductor devices (3)
1060033 – Electronic circuit theory1 (3)
1060742 – Electronic circuit Engineering 1 (3)
1060752 – Electronic circuit Engineering 2 (3)
1061210 – Calculation method (3)
1061230 – Computer Organization (3)
1061260 – Digital Com. (2)
4130330 – Specialized English ETE (2)
1061333 – Pulse Engineering (2)
1060283 – Pulse Engineering lab (1)
1060852 – Electronic Circuit Engineering Project (2)
1061280 – Electronic Measurement (2)
1061043 – Electronic Measurement lab (1)
1170011 – Environment (2)
1060473 – Microelectronic Technology (2)
1061240 – Electronic Com. (2)
1060822 – Applied Electronics (2)
1061503 – Applied Electronics lab (1)
1060832 – Microcontroller (2)
1060383 – Microcontroller lab (1)
1060503 – Logic Control (2)
1061053 – Logic Control lab (2)
1061300 – Working Practice (2.5)
1180332 – Economic management (2)
1061430 – Electronic Engineering Project (2)
Only offer in SEM 8
1061400 – Graduation Internship (2)
Specialized Elective courses (10)
All theorical, experimental courses of previous semesters
1061143 – Graduation Project (10)
SEM 6
SEM 7
SEM 8
SEM 9

Specialization: Telecommunication Engineering



Specialization: Computer Engineering



6. Course description

6.1. English A (3TC)

Elementary English

6.2. English B (4TC)

Intermediate English

6.3. Specialized English (2TC)

English in Electronic and Telecommunication Engineering

6.4. Electronic devices (3TC)

The aim of this course is to provide students with basic knowledge of physics of semiconductors, structures, operating principles, parameters and application circuits of discrete devices (diodes, transistors (FETs, BJTs), power electronic devices), and analog and digital integrated circuits (op-amp, logic gates). This course also helps students to develop knowledge to design and implement electronic circuits, as well as further study related courses.

6.5. Data Structures (2TC)

The purpose of this course is to provide the students with solid foundations in the basic concepts of programming: Data structures and Algorithms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter. This course is also about showing the correctness of algorithms and studying their computational complexities. This course offers the students a mixture of theoretical knowledge and practical experience.

6.6. Selected topics in Electronics (2TC)

The course provides students with the Specialization in Electronics Engineering with advanced and up-to-date knowledge in Electronics Engineering. Course contents vary from year to year and will be updated on an annual basis.

6.7. Selected topics in Computer Engineering (2TC)

This is a selected course for final year student of Computer Engineering. The purpose of this course is to provide the senior students up-to-date researches and technologies related to their field of study. Since this is the course on special topics, the contents could be modified/changed depending on specific class, semester, or suggestion of the in-charge lecturer

6.8. Selected topics in Telecommunication Engineering (2TC)

Introduction of wire and wireless information communication systems and their related topics.

6.9. Software engineering (2TC)

This course will study a collection of methods which embody an "engineering" approach to the development of computer software. We will discuss the nature of software and software projects, software development models, software process maturity, project planning, management, and communication. We will study methods for analysis, design, testing, and implementation of large, complex software systems.

6.10. Microelectronic technology (2TC)

This subject presents VLSI semiconductor integrated circuit technology and related issues, focusing on submicron CMOS technology, hardware description languages, EDA design automation tools, IC simulation and testing issues. The subject focuses on practical examples to enable students to be able to apply knowledge in practice and in research.

6.11. Algebra (3TC)

The module presents the linear algebra theory as the basis for the specialized applied sciences. The modules include matrix theory, determination, linear systems, vector space, linear mapping and quadratic form.

6.12. Communication Electronics (2TC)

The course aims to provide students with basic knowledge about Communication Electronic systems; Transmitters, receivers; Techniques used in the system: phase locked loop (PLL), high frequency power amplifier, frequency multiplier; Design impedance matching circuit, transformer coupling at output.

6.13. Applied electronics (2TC)

This course covers knowledge of UJT and high-power electronic circuits using SCR, TRIAC, MOSFETs; Heat sensors and control circuits, temperature stability; inverters and single-phase and three-phase inverters; alternating voltage circuits and regulators (linear and pulsed); principle of speed control of DC and AC motors; principle of heating by induction currents and dielectric loss.

6.14. Biomedical electronics (2TC)

This course covers knowledge on the mechanism of electrical phenomena, cell membranes and neurons, effects of electric currents on living organisms; principles of cardiac activity and diagnostics of cardiovascular equipment; principles of brain activity and diagnostics of neurological diagnostics.

6.15. Logic control (2TC)

This course provides students with theoretical and practical knowledge of logic control, PLC hardware architecture, use of input, arithmetic operations, timer, counter, interrupt, computer communication for building computing and control applications. The course also shows the methodology for building and writing programs from the given problem. Upon completing this course, students will be able to design automated small and medium automation problems with acceptable reliability.

6.16. Electronic engineering project (2TC)

Upon completion of the module, students will be able to design, simulate, implement, and prototype electronic circuits as well as electronic systems used in electronic engineering.

6.17. Telecommunication engineering project (2TC)

Upon completion of the module, students will be able to design and simulate some devices and modules used in communications system as well as communication systems. This course provide student the fundamental knowledge for final year project.

6.18. Computer engineering project (2TC)

Design and simulation of digital systems using VHDL/Verilog; design and implementation of applications based on available MPU, MCU; development of multimedia applications.

6.19. Comunication Electronics Project (2TC)

The course aims to provide students with knowledge of the design and build of communication electronic circuits: transmiting circuits, AM and FM receivers, intermediate and high frequency power amplifiers, modulation and demodulation circuits, FM modulation, stereo FM ...Based on this, the course help to form the learning and teamwork skills for students.

6.20. Electronic circuit engineering project (2TC)

Reviewing the fundamental knowledge for power amplifier: the principle, schematic, and reconfigure of the amplifier; the design the circuit; the implementation of the hardware for the amplifier.

6.21. Graduation project (electronics) (10TC)

Design and implementation of electronic applications/systems based on available MPU, MCU; design and implementation of digital systems on reconfigurable hardware using VHDL/Verilog and FPGA; design and verification of VLSI chips using professional CAD software.

6.22. Graduation project (computer engineering) (10TC)

Design and simulation of digital systems using VHDL/Verilog; design and implementation of applications based on available MPU, MCU; development and implementation of multimedia applications.

6.23. Graduation project (telecommunication engineering) (10TC)

Upon completion of the module, students will be able to design, simulate electronic design used in communication systems as well as comunications systems.

6.24. Electronic measurements (2TC)

The aim of this course is to introduce the structure, principles of common electronic instruments such as oscilloscopes, DMM, frequency counter; methods of measuring the quantities, basic parameters of circuits and electronic devices; the use of electronic measuring devices to measure parameters, parameters in electronic circuits; as well as test procedures in electronic devices.

6.25. Revolutionary way of the Vietnamese Communist Party (3TC)

Revolutionary way of the Vietnamese Communist Party

6.26. Caclculus 1 (4TC)

Topics include basics knowledge about functions of one variable, limits, continuity, derivatives and differentials, integrals and applications.

6.27. Calculus 2 (4TC)

This course includes concepts, formulas and applications of multiple integrals (double and triple integrals), line integrals (type 1 and 2), surface integrals (type 1 and type 2), series (number and functional series) and ordinary differential equations.

6.28. Descriptive Geometry (2TC)

Descriptive geometry is the branch of geometry which allows the representation of three-dimensional objects in two dimensions, by using a specific set of procedures. The resulting techniques are important for engineering, architecture, design and in art. The education in Descriptive Geometry provides a training of the students' intellectual capability of space perception.

Students should be able to construct conics using their focus properties. Understand and get the basics of projection: coted, Monge`s projection, orthogonal axonometry. They should be able to solve simple 3D problems, display the basic geometric bodies and surfaces in each projection, their section. an orthogonal closed rule right helicoidal surface. They construct a prism, cone, sphere, cylinder, hyperbolic paraboloid and parabolic conoid using specified elements. They should be able to solve problems intersection of surfaces.

6.29. General chemistry (2TC)

This course aims to provide students basic knowledge of chemistry that enable them to read and understand materials in chemistry-related science and technology, namely: basic concepts, basic laws of chemistry; atomic structure; the periodic table and the periodic laws; chemical bonding and condensed states of matter, mainly on crystals; basic principles of thermodynamic; dynamic chemistry, electrochemistry.

6.30. Computer Architecture and Design (2TC)

To introduce modern computer architecture with parallelism. Quantitative design and measuring. Instruction-level Parallelism (ILP) and the limitations of ILP. Thread-level Parallelism (TLP). Design hierarchical memory and storage systems.

6.31. Economics for Engineering (2TC)

This subject belongs to the economic knowledge, equips the students with knowledge of the foundation of business management. With the transition from a centrally planned economy to a market economy, the demand for knowledge and skills on economic management for engineers is becoming increasingly essential. Therefore, the course is designed to best meet the above requirements, including the contents of the enterprise management organization, organization and management of production processes, corporate finance management, investment process management and basic knowledge about the marketing activities of enterprises in the market economy in line with the trend of international integration.

6.32. Antenna Engineering (2TC)

This course will provide students fundamental principles of antennas such as Maxwell's equations, the basic principles of radiation and typical antenna concepts such as gain, directivity, radiation resistance and radiation pattern. Students also learn about the properties of commonly used antennas such as dipole antennas, array antenna, aperture antenna… as well as the concepts

of antenna synthesis, effective area, polarization mismatch, effective complex length, impedance mismatch...

6.33. Switching engineering (2TC)

This course provides basic knowledge of the theoretical background of switching engineering to support voice, data, video, multimedia ... across wide area networks including channel switching, packet switching, ISDN, Frame Relay, ATM and MPLS.

6.34. Multimedia engineering (2TC)

This course mainly provides concepts, models, techniques and applications of multimedia computing. It consists of processing on the multimedia signal: speech, sound, image and video; their presentation, coding techniques, standards, quality assessment criteria

6.35. Electric engineering (2TC)

The course is designed to supply students with knowledge of fundamental theory about electrical engineering, as a background for other engineering subjects. The basic content of the course consists:

- The fundamental concepts and laws of energy circuits, sine source electrical ciruits, electrical circuits problem solving methods.
- The concepts, structures and operation principles of electrical machine; show the equations and energy process in electrical machine and solving methods.

6.36. Telephony (2TC)

This course provides basic knowledge of the theoretical background of voice communications, telephone and telephony switching system

6.37. Computer programming (2TC)

This course provides basic knowledge of the C ++ programming language such as variables, statements, keywords, operations, expressions, basic control structures (if, else, while, do-while, for), arrays and strings, pointers, class, object-oriented programming, memory management, template, operator overloading. This course helps students to develop programming skills and solve programming problems using C++.

6.38. Electronic circuit engineering 1 (3TC)

Reviewing the fundamental knowledge for power amplifier: the principle, schematic, and reconfigure of the amplifier; the design the circuit; the implementation of the hardware for the amplifier.

6.39. Electronic circuit engineering 2 (3TC)

The course aims to provide students with knowledge of Opamp for amplification, calculation, control and function creation; oscillation circuit; principle of oscillation and calculation of oscillation circuits using BJT and FET; modulation and demodulation techniques AM, FM, PM; frequency mixing; ADC and DAC: conversion principle, common conversion methods

6.40. Thermal engineering (2TC)

Fundamental of thermal engineering

6.41. Microwave engineering (2TC)

The subject presents theoretical foundations and applications of: transmission line theory; microwave network analysis; impedance matching and tuning; power dividers and directional couplers; microwave filter theory and design. The subject focuses on practical examples to enable students to be able to apply knowledge in practice and in research.

6.42. Digital circuits and systems (3TC)

This course provides basic knowledge about digital circuits and systems. After completing this course, the students will be able to carry out the analysis, design and synthesis of combinational and sequential digital circuits, as well as the use of hardware description language and design tools (CAD) for the description and synthesis of digital circuits and systems.

6.43. Television engineering (2TC)

The course aims to provide students with basic knowledge of the television engineering including black and white, color, digital, high definition television standards; black and white receiving techniques; the physical basis of color television technology and the principle of building color television system; block diagrams, coding methods, color decoding of various television systems

6.44. Microcontroller (2TC)

This course provides students basic knowledge about Microcontrollers with a focus on the most common 8051 Microcontroller families, referring to: 8051 hardware architecture, instruction set, timer, serial interface, interrupt, Assembly language and programming tools.

6.45. Microprocessor-based Systems Design (3TC)

This course introduces the architecture of a microprocessor-based system using the common on market, modern microprocessors and microcontrollers. Programming in Assembly Language and High Level languages such as C. Using tools such as Assembler, Compiler and Debugger to develop software for a microprocessor-based system. Methods of interfacing the microprocessor to a variety of peripheral devices. This course also provides basic knowledge and skills needed to develop application systems based on embedded processors later.

6.46. Pulse engineering (2TC)

This course covers knowledge of pulse voltage, pulse and light pulses; electronic switches using BJT, FET, OPAMP, ... and pulse signal converter and generators.

6.47. Electronic circuit theory 1 (3TC)

The aim of this course is to develop the fundamental tools of linear circuit analysis: basic concepts and laws of electric circuits, circuit analysis techniques, operational amplifiers, first and second order circuit analysis techniques

6.48. Electronic circuit theory 2 (3TC)

The aim of this course is to provide fundamental concepts of mutually passive networks, non-mutually active networks, non-linear elements and systems, Bode diagrams, analysis and calculation techniques for non-linear networks.

6.49. Information Theory (2TC)

Information theory of discrete and continuous variables, lossy and lossless coding, signaling modeling methods in coding, channel capacity estimation.

6.50. Computer communication networks (2TC)

This course provides an introduction to underlying concepts in the design and implementation of computer communication networks, networking protocols and their application. Topics to be covered include: An overview of network architectures, application layer, transport layer, network layer and data link layer protocols; congestion control, routing, network addressing, local area networks, wireless networks. Examples will be based primarily on the Internet protocols (TCP/IP protocols stack: HTTP, TCP, UDP, IP,…).

6.51. General Environment (2TC)

This subject is belonging to the general education, providing students with a basic understanding of the environment, resources and ecosystems. The knowledge of pollution in air, water, soil, solid waste and other types of pollution such as noise, heat and radiation; On the basis of that, the daily solution for environmental pollution can be implemented. In addition, the course also helps students understand the concepts, principles and solutions to achieve the environmental harmony and sustainable development as well as some key contents of Vietnam's environmental law.

6.52. Introduction to Engineering (2TC)

Theory and practice of basic soft skills including teamwork, communication, oral presentation, technical report writing, creative thinking; Introduction of applications of Electronic engineering, Telecommunication engineering, and Computer engineering; Introduction to Electronic and Telecommunication engineering - related fields

6.53. Basic principles of Marxism-Leninism 1 (2TC)

The module provides basic knowledge of Marxism-Leninism: material and consciousness; pairs of categories of materialist dialectics; the role of production and rules of production relations in line with the development level of the productive forces; infrastructure and superstructure; class and class struggle; the people and the creative role of the history of the people.

6.54. Basic principles of Marxism-Leninism 2 (3TC)

The module provides basic knowledge of Marxism-Leninism: material and consciousness; pairs of categories of materialist dialectics; the role of production and rules of production relations in line with the development level of the productive forces; infrastructure and superstructure; class and class struggle; the people and the creative role of the history of the people.

6.55. General Law (2TC)

The General Law course has been designed to provide learners with the most basic knowledge about the state and the law, such as: State apparatus, legal norms and legal

relationships, law violations ... The course also provides some basic knowledge about Civil Law, Administrative Law, Criminal Law and Anti-Corruption Law.

6.56. Numerical methods (3TC)

This course is an introduction to the numerical methods. The primary objective of the course is to develop the basic understanding of numerical algorithms and skills to implement algorithms to solve mathematical problems on the computer.

6.57. Digital filter design (2TC)

This course provides basic knowledge about digital filter structure and its design requirement. Students should be able to design FIR and IIR filters and use different methods. Matlab is used to design digital filters for practical applications.

6.58. Embedded Systems Design (2TC)

This course provides the concept of an embedded computer system and its application. Hardware and software components of an embedded computer system. Specification, Design, Implementation and Test of an embedded computer system that interacts with external world. Hardware design using MCU, MPU, DSPs chips or development toolkit boards. Software development using Assembly language and/or High-Level languages such as C/C++, Java ... Real Time Operating Systems (RTOS) for embedded systems.

6.59. Mobile Communications (2TC)

This course provides students with the following knowledge of: the fundamental theory of mobile communication systems; transmission techniques in broadband telecommunications networks; related research issues.

6.60. Digital Communications (2TC)

Basic signal processing steps in a typical digital communication system such as formatting, source encoding, channel encoding, multiplexing, digital modulation. Principles and trade-off between system objectives in terms of signal-to-noise ration, error probability, and occuppied bandwidth

6.61. Optical Fiber Communication (2TC)

Opertating principle and configuration of main parts of optical fiber communication system such as: optical fiber, laser sources, photo-detection, optical amplifiers, SDH, wavelength-division multiplexing (WDM), design of a optical fiber communication system.

6.62. Microwave-Satellite Communications (2TC)

The course aims to provide students with basic knowledge of the transmitting and receiving of two microwave communication systems and satellite communications: operational principles, block diagrams, digital modulation, signal propagation methods, dominant interferences affect the link quality. Based on that, students carry out to design the system to meet the demand the given quality.

6.63. Fundamental Informatics Lab (1TC)

This course aims to provide students with basic knowledge of computing and how to use basic applications on operating systems, MS Word, MS Excel, MS PowerPoint, and services on

the internet. The course also presents how to use C programming language to solve some basic math problems.

6.64. Working Practice (Electronics) (2.5TC)

This course provides students with knowledge about electronic measuring instruments. Students learn to check operation of electronic components, repair circuits and build circuit boards. Once completing the course, students have ability to analyze, repair and build electronic equipment/product.

6.65. Working Practice (Computer engineering) (2.5TC)

This course provides students with knowledge about electronic measuring instruments. Students learn to check operation of electronic components, repair circuits and build circuit boards. Once completing the course, students have ability to analyze, repair and build electronic equipment/product.

6.66. Working Practice (Telecommunication engineering) (2.5TC)

This course provides students with knowledge about electronic measuring instruments. Students learn to check operation of electronic components, repair circuits and build circuit boards. Once completing the course, students have ability to analyze, repair and build electronic equipment/product.

6.67. Graduation internship (Electronic engineering) (2TC)

Students go to companies and enterprises to participate in activities such as manufacturing, research, design, and operating; this internship allows the students to apply their accumulated knowledge in electronics, computer engineering, and automatics to practical activities. Besides, the students should be familiar with industrial disciplines, ethics, and social responsibility. It is also an opportunity for the students to look for the final project's topic. At the end of the internship, the students need to write a report and ask for comments from the companies/enterprises.

6.68. Graduation internship (Computer engineering) (2TC)

Students go to companies and enterprises to participate in activities such as manufacturing, research, design, and operating; this internship allows the students to apply their accumulated knowledge in electronics, computer engineering, and automatics to practical activities. Besides, the students should be familiar with industrial disciplines, ethics, and social responsibility. It is also an opportunity for the students to look for the final project's topic. At the end of the internship, the students need to write a report and ask for comments from the companies/enterprises.

6.69. Graduation internship (Telecommunication engineering) (2TC)

Students go to companies and enterprises to participate in activities such as manufacturing, research, design, and operating; this internship allows the students to apply their accumulated knowledge in electronics, computer engineering, and automatics to practical activities. Besides, the students should be familiar with industrial disciplines, ethics, and social responsibility. It is also an opportunity for the students to look for the final project's topic. At the end of the

internship, the students need to write a report and ask for comments from the companies/enterprises.

6.70. Signals and Systems (3TC)

The course aims to provide students with basic knowledge of signal and systems; provide students with basic knowledge of linear systems; signal and system analysis in time domain, frequency domain and Laplace transform; analog filter design. Provide student knowledge to further study the relevant modules later.

6.71. Fundamental Informatics (2TC)

This course aims to provide students with basic knowledge of computing and how to use basic applications on operating systems, MS Word, MS Excel, MS PowerPoint, and services on the internet. The course also presents how to use C programming language to solve some basic math problems.

6.72. Computer programming lab (1TC)

The purpose of this course is that students can practice their learned knowledge in Computer Programming course. This course is organized into 4 lab sessions. They will learn how to setup and install CodeBlocks, print out data from keyboard, if else, looping, class. After finishing three Labs, the students will choose a presentation topic with OOP (Object-oriented programming).

6.73. Electronic devices lab (1TC)

Basic knowledge about diode and the way to indetify charactoristic of diode, Mosfet, Jfet. The application of diode, MOSFET, JFET, CMOS and quare wave generator circuits.

After finishing this course, the students have ability to identify damage devices and evaluate many kinds of electronic devices.

6.74. Applied electronics lab (1TC)

This course helps students to test the learned theory on the circuit board. Students test the working principle of voltage stabilizer circuit, inverter, motor control. Students analyze the factors that affect the principle of electronic circuit operation.

6.75. Logic control lab (1TC)

In this course, students will program the PLC S & -200 in the application circuit to turn off lights, engine control, traffic system, conveyor system, water supply system, decorative lighting system, etc.

6.76. Electronic measurement lab (1TC)

In this module students will revise their knowledge of electronic circuits in the electronic measurement module. Know the operations and how to use digital oscilloscopes to apply the most accurate measurements. Digital multimeter [DMM], functional waveform generator and other electronic measuring devices.

Measurement skills, functional tests, damage checks, know how to use the meter.

6.77. Antenna engineering lab (1TC)

Practise on the skills of using laboratory tools to understand the Antenna Engineering lesson

6.78. Electric engineering lab (0.5TC)

The course is designed to help students improve their practical and experimental skills, enhance their understanding of electrical equipment, and consolidate their theoretical knowledge of electrical and electronic circuits, specify characteristics of electrical circuits and electric machines by experiment. The basic content of the module consists of 04 tests:

- Single phase circuit experiment.
- Three phase circuit experiment.
- Transformer experiment.
- Three phase asynchronous motor experiment.

6.79. Electronic engineering lab (1TC)

The course content includes basic testing about Transistor, mesure and evaluate charactoristic of transistor; Survey some amplifier circuits (EC, BC, CC) in DC and AC mode. Then take a survey with power amplifier circuits (OTL), direct-coupled amplifier and indirect-coupled amplifier.

After completing the course, the students have ability to identify and evaluate electronic devices and understand operating principle as well as know the way to testing, evaluate amplifier circuits using transistor.

6.80. Digital engineering lab (1TC)

This subject provides introduction tofundamentals of digital circuits, encoder circuits, decoders, assemblies, sequential systems.After completing the subject, students will be able to analyze digital circuits and apply them in reality.

6.81. Pulse engineering lab (1TC)

This subject provides introduction to basic pulse signals, electronic and pulse switching circuits, multi-harmonic oscillator circuits (working in different modes with BJT, OPAMP, logic gate, timing circuit and ICs), swing blocking and voltage sweeping circuits, power Lines. After completing the subject, students will be able to analyze pulse circuits and apply them in reality.

6.82. Electronic circuit engineering lab (1TC)

The course content includes basic testing about Transistor, mesure and evaluate charactoristic of transistor; Survey some amplifier circuits (EC, BC, CC) in DC and AC mode. Then take a survey with power amplifier circuits (OTL), direct-coupled amplifier and indirect-coupled amplifier;

After completing the course, the students have ability to identify and evaluate electronic devices and understand operating principle as well as know the way to testing, evaluate amplifier circuits using transistor.

6.83. Microcontroller lab (1TC)

In this module students will be programming applications for microcontrollers in A / D converters, leds and LCD display circuits, audio and motor control circuits, serial communication circuits.

6.84. Microprocessors lab (1TC)

Through these labs, students can practice programming skills in assembly language and C/ C ++ / Java languages for various processor families, exploiting microprocessor interface functions to control specific peripherals such as LED display, LCD display, motor control, ADC, DAC.

6.85. Computer Communication Networks lab (1TC)

The purpose of this course is that students can practice their learned knowledge in Computer Communication Networks. This course is organized into 4 lab sessions. They will learn how to setup and install Wireshark, using Wireshark to capture network package then analyze and evaluate the package. Thereby understand the network protocols like HTTP, TCP/IP, Ethernet and ARP.

6.86. Microwave engineering lab (1TC)

Practise on the skills of using laboratory tools to understand the Microwave Engineering lesson.

6.87. Signal and system lab (1TC)

Practise on the skills of using laboratory tools to understand the Signal and system lesson.

6.88. Digital filter lab (1TC)

Through theoretical foundations and labs, students practice programming skills in the MATLAB language to design FIR and IIR filters.

6.89. Communication system lab (1TC)

Practise on the skills of using laboratory tools to understand the Communication electronics lesson and Digital communications lesson.

6.90. Physics Experiment (1TC)

This course includes experiments about Mechanis, Thermodynamics, Electricity and Magnetism and Optics.

6.91. Computer Organization (3TC)

To introduce modern computer architecture. To evaluate computer performance. Instruction Set Architecture (ISA) and Assembly language programming. Computer Arithmetic. To design the processor: Datapath, Control, Pipelining. Hierarchical memory, Cache memory.

6.92. Specialized mathematics (3TC)

This subject presents theoretical basis and applications of: field theory, operators of differential geometry; complex function, Laplace transform, and Fourier transform. The subject focuses on specific examples of the Electronics and Telecommunications specialization to enable students to apply knowledge in practice and in research

6.93. Electromagnetic field (3TC)

Introduction to Electric field, Magnetic field, Electromagnetic waves, Electromagnetic radiation and Electromagnetic waves in oriental propagation structures. Apply the fundamental

theorems of the Electromagnetic Field and Maxwell's Equations for static electromagnetic fields and Time-variant electromagnetic fields problems

6.94. Data Transmission (2TC)

This course focuses on the fundamentals of data communication networks. One goal is to give some insight into the rationale of why networks are structured the way they are today and to understand the issues facing the designers of next-generation data networks. Much of the course focuses on network algorithms and their performance. Students are expected to have a strong mathematical background and an understanding of probability theory. Topics discussed include layered network architecture, Link Layer protocols, high-speed packet switching, queuing theory, Local Area Networks, and Wide Area Networking issues, including routing and flow control.

6.95. Wave propagation (2TC)

The subject presents the basis of free-space radio wave transmission; radio wave propagation with interfering effects from ground-based reflections; wave propagation by the ionosphere; surface wave propagation; and wave propagation in the millimeter range with the effect of different environment.

6.96. Ho Chi Minh's thought (2TC)

Ho Chi Minh's thought.

6.97. Physics 1 (3TC)

Physics 1 presents knowledge relative to Mechanics, Electricity and Magnetism which includes:

- Laws, theorem of motions of particles, system of particles, and rigid bodies.
- Laws of conservation of momentum and energy in motion and collisions.
- Properties and laws of interactions in electric field and magnetic field, motions of charged particle in the field.

6.98. Physics 2 (3TC)

The course includes Thermodynamics, Optics and Modern Physics:

+ Thermodynamics consisting of Molecular physics and Laws of thermodynamics tends to give students opportunity to explore:

- the motion of gas molecules, the definition of quantities characteristic of thermodynamic systems such as pressure, temperature, volume and the relations among them.
- the concept of internal energy, the conservation of energy of gases, laws of thermodynamics and their applications.
- thermodynamics also addresses real gases, liquid and phase transformations.

+ Optics gives students opportunity to study phenomena related to the wave nature of light such as interference, diffraction, and polarization.

+ Modern Physics introduces the theories developed since 20^{th} century including Quantum Optics, Quantum Mechanics and Atomic Physics.

- Quantum Optics is about thermal radiation with the ultraviolet catastrophe, Planck's hypothesis, the quantum theory of light and explanation of the particle nature of light through the photoelectric and Compton effects.

- Quantum Mechanics covers the wave nature and wave function of micro-particles, the Schrodinger equation and its application to problems of particle in a well of infinite height and tunneling effect.

- Atomic Physics is focused on the application of quantum mechanics to the study of the hydrogen atom and single-electron ions with and without magnetic field.

6.99. Descriptive Geometry (2TC)

Engineering drawing is a two-dimensional representation of three dimensional objects. In general, it provides necessary information about the shape, size, surface quality, material, manu facturing process, ect., of object. It is the graphic language from which a trained person can visualise objects. Hence, engineering drawing is called the universal language of engineers. Drawing practice must follow certain rules, if it is to serve as ameans of communication. Fot this purpose, Bureau of Vietnamese Standards (TCVN) adapted the International standards on code of practice for drawing.

6.100. Probability and Statistics (3TC)

The course of probability and statistics equips the basis of probability and mathematical statistics method. Probability theory introduces the basic contents of random events, probability; random variables and its probability distributions; limit theorems; random vectors, conditional expectation, covariance, and correlation coefficient. Statistics include the basic contents of sample theory, descriptive statistics; estimation of parameters; test of statistical hypotheses for one sample and two samples.

6.101. Digital image processing (2TC)

This course provides basic knowledge about image processing and well-known topics in a imaging system, including image representation, color spaces, filtering, image enhancement in the spatial domain and in the frequency domain, restoration, transform, coding, and segmentation.

6.102. Digital signal processing (3TC)

This course provides basic knowledge about discrete signal and discrete systems. The course considers mainly analysis methods, time-invariant operators, and frequency by using mathematical tools such as convolution, Z-transform, Fourier transforms. Some simple discrete systems and DSP applications are also considered.

7. Course syllabus

Refer to Appendix

8. Program implementation guildlines

This program is applied from the 2017 enrollment to train regular students of Electronic and Telecommunication Engineering.

The education is based on the designed curriculum, training objectives and target audience, human resource requirements and specific conditions for training.

For the elective modules, depending on the actual situation of the development trend, social needs, the Faculty will advise students choose elective modules.

The Dean of the Faculty is responsible for organizing and instructing the disciplines to develop the syllabus in detail to ensure that the objectives, content and requirements are met and, at the same time, meet the needs of learners and the society. Based on the detailed syllabus of the unit, the budget for practicing, practicing, field trip and additional procurement of equipment, machinery, chemicals, testing instruments for each module and the whole course. Heads of concerned units shall have to inspect, evaluate and submit them to the principal for approval.

The program shall be reviewed and updated every 2-3 years, should there br any necessary to update to meet the new goals and standards. The faculty shall submit a written report to the University for consideration and settlement according to current regulations.

Đà Nẵng, 2017

Dean

(signed)

Assoc. Prof. Nguyễn Văn Tuấn

Vice. Rector

(signed)

Assoc. Prof. Lê Cung