Bachelor Degree in Electronics and Telecommunications (4 years)
Engineer Degree in Electronics and Telecommunications (5 years)

5-year Engineer Degree in Electronics and Telecommunications

4-year Bachelor Degree

General Education (49)	Professional Mandatory (49)				Optional (15)	Graduation Project
Algebra (4)	Introduction to Electronics and Telecommunications Engineering (2)	Data Structures and Algorithms (2)	Project I (2)	Project II (2)	***Electronics and Computer***	Graduation Internship (2), Graduation Project (6)
Statistics (3)		C/C++ programing (2)			Operating Systems (3)	
Analytics 1, 2, 3 (10)		Software Engineering (2)			Computer Networks (3)	
Physics 1, 2, 3 (9)		Basic Practicum (2)	Electronic Devices (3)		Cryptography (3)	
English (6)			Circuit Theory (3)		Fundamentals of Data Communications (3)	
Introduction of Computer Science (4)			Analog Electronics (3)		Telecommunication Systems (3)	
Social science and Politics (10)			Digital Electronics (3)		***Communication Engineering***	
			Analog Electronics 2 (2)		Wireless Communications (3)	
			Microprocessor (3)		Telecommunication Systems (3)	
			Electronic Measurement (2)		Fundamentals of Data Communications (3)	
			Signals and Systems (3)		Computer Networks (3)	
			Information Theory (2)		Cryptography (3)	
			Electromagnetic Field (3)			
			Anten and Propagation (2)		***Aerospace Electronics***	
			Digital Communications (3)		Data & Telegram Transmission (3)	
			Digital Signal Processing (3)		Localization & Electronic Navigation (3)	
					Cryptography (3)	
					Wireless Communications (3)	
					Telecommunication Systems (3)	
					Multimedia	
					Multimedia (2)	
					Computer Networks (3)	
					Television (2)	
					Fundamentals of Data Communications (3)	
					Cryptography (3)	
					Telecommunication Systems (3)	
					Biomedical	
					Bioelectricity Fundamentals (2)	
					Human Anatomy and Physiology (2)	
					Sensors and Measurement Techniques in Biomedicine (3)	
					Biomedical Signal Processing Circuits (3)	
					Medical Imaging Techniques (3)	
					Biomedical Electroni Equipment (2)	

1) 5 minors: Electronic Engineering, Computer Engineering, Communication Engineering, Aerospace Electronic Engineering, Biomedical Engineering
2) Number in brackets are the number of credits
3) (*) is the mandatory course

1-year Engineer Degree

Mandatory Courses (13)		Optional Courses (6)	Graduation Project
Electronic Engineering (13)	Project III (3)	***Electronic Engineering (6)***	Graduation Practicum (2), Graduation Project (6)
Digital System Design and Synthetic (2)		Computer Architecture (2)	
VLSI Design (3)		Analog IC Design (2)	
Embedded System Design (3)		Advanced Programing (2)	
Power Electronics (2)		Digital Image Processing (2)	
		Multimedia (2)	
Computer Engineering (13)		***Computer Engineering - Optional (6)***	
Embedded System Design (3)		Power Electronics (2)	
Computer Architecture (2)		Artificial Intelligence and Applications (3)	
Advanced Programing (2)		Multimedia (2)	
Object-oriented Analysis & Design (3)		Digital Image Processing (2)	
		Mobile Programming (2)	
Communication Engineering (13)		***Communication Engineering - optional (6)***	
Communication Networks (2)		Optical Communications (2)	
Microwave Technique (2)		Multimedia (2)	
Mobile Communication Systems (2)		Advanced Programming (2)	
Satellite Communications (2)		Digital Image Processing (3)	
Telecommunication Network Planning and Management (2)		Object-Oriented Analysis & Design (3)	
		Artificial Intelligence and Applications (3)	
Aerospace Electronics (13)		***Aerospace Electronics (6)***	
Avionics Communication Networks (2)		Object-Oriented Analysis & Design (3)	
Satellite Navigation (3)		Computer Networks (3)	
Remote Sensing and GIS (3)		Microwave Technique (2)	
Navigation and Airline Management (2)		Advanced Programming (2)	
		Digital Image Processing (3)	
		Multimedia (2)	
Multimedia (13)		***Multimedia - optional (6)***	
Digital Image Processing (3)		Artificial Intelligence and Applications (3)	
Sound Signal Processing (3)		Mobile Communications (2)	
Multimedia Information System (2)		Object-oriented Analysis & Design (3)	
Computer Graphics (2)		Advanced Programming (2)	
		Virtual Reality and Enforcement Reality (2)	
		Multimedia Production (2)	
Biomedical (13)		***Biomedical (6)***	
Medical Imaging Technology II (3)		Radiation and Electrical Safety in Medicine (3)	
Radiation Therapy and Nuclear Medicine (2)		Digital Biosignal Processing (3)	
Medical Imaging Processing (2)		Medical Equipment Management (3)	
Medical Information Systems (2)		Embedded System Design (3)	
Biomedical Electronic Equipments II (2)		Advanced Programming (2)	
		Object-oriented Analysis & Design (3)	

Bachelor Degree in Electronics and Telecommunications
M.Sc Degree in (1) Electronic Engineering, (2) Communication Engineering, (3) Bio-Medical Engineering (Application-oriented)

4-year Bachelor Degree in Electronics and Telecommunications

General Education (49)

- Algebra (4)
- Statistics (3)
- Analytics 1, 2, 3 (10)
- Physics 1, 2, 3 (9)
- English (6)
- Introduction of Computer Science (4)
- Social science and Politics (10)

Mandatory (49)

- Introduction to Electronics and Telecommunications Engineering (2)
- Data Structures and Algorithms (2)
- C/C++ programing (2)
- Software Engineering (2)
- Project I (2)
- Basic Practicum (2)
  - Electronic Devices (3)
  - Circuit Theory (3)
  - Analog Electronics (3)
  - Digital Electronics (3)
  - Analog Electronics 2 (2)
  - Microprocessor (3)
  - Electronic Measurement (2)
  - Signals and Systems (3)
  - Information Theory (2)
  - Electromagnetic Field (3)
  - Antenna and Propagation (2)
  - Digital Communications (3)
  - Digital Signal Processing (3)
- Project II (2)

Optional (15)

Electronics and Computer
- Operating Systems (3)
- Computer Networks (3)
- Cryptography (3)
- Fundamentals of Data Communications (3)
- Telecommunication Systems (3)

Communication Engineering
- Radio Communications (3)
- Telecommunication Systems (3)
- Fundamentals of Data Communications (3)
- Computer Networks (3)
- Cryptography (3)

Aerospace Electronics
- Data & Telegram Transmission (3)
- Localization & Navigation (3)
- Cryptography (3)
- Radio Communications (3)
- Telecommunication Systems (3)

Multimedia
- Multimedia (2)
- Computer Networks (3)
- Television (2)
- Fundamentals of Data Communications (3)
- Cryptography (3)
- Telecommunication Systems (3)

Biomedical
- Biomechanics (2)
- Human Anatomy and Physiology (2)
- Sensors and Measurement Techniques in Biomedicine (3)
- Biomedical Signal Processing Circuits (3)
- Image-based Diagnostics I (3)
- Biomedical Electroni Equipment I (2)

Graduation Project

Graduation Internship (2), Graduation Project (6)

1) 3 minors: Electronic Engineering, Communication Engineering, Biomedical Engineering
2) Number in brackets are the number of credits
3) (*) is the mandatory course

1,5-year Master of Science (Application-oriented) (45)

Basic courses (12 - 15)	*Advance courses (12 - 15)*
Master in Electronic Engineering	
Electronic Engineering	
VLSI Design (3) *	Research Methodology (2) *
Embedded System Design (3) *	Artificial Intelligence and Applications (3) *
Power Electronics (2) *	Real-time Systems (2)
Design and Synthesis of Digital Systems (2) *	Distributed Systems (2)
Analog IC Design (2)	Advanced Digital Signal Processing (2)
Complex Networks and Applications (3)	Hardware Verification (2)
Project III (3) *	Computer Vision (2)
Computer Engineering	
Embedded System Design (3) *	Research Methodology (2) *
Computer Architecture (2)*	Distributed Systems
Object-oriented Analysis & Design (3)	Real-time Systems (2)
Advanced Programing (2) *	Artificial Intelligence and Applications (3)
Mobile Programming (2)	Advance Computer Architecture (2)
Complex Networks and Applications (3)	Computer Vision (2) *
Project III (3) *	
Master in Communication Engineering	
Communication Engineering	***Advance courses for all directions***
Communication Network (2) *	Research Methodology (2) *
Microwave Technique (2) *	Advanced Digital Signal Processing (2) *
Mobile Communication Systems (2) *	Wireless Communication System Analysis and Design (2)
Satellite Communications (2)	Future Internet (2)*
Telecommunication Network Planning and Management (2)	Time-Space Signal Processing (2)
Optical Communications (2)	Cloud and Edge Computing (2)
Multimedia Systems (2)	System Modelling and Numerical Simulation Method (2) *
Project III (3) *	Artificial Intelligence and Applications (3)
Aerospace Electronics (13)	Network Security (2)
Avionics Information Networks (2) *	Advanced Information Theory and Channel Coding (2)
Satellite Navigation (3) *	Microwave Circuit Design (2)
Remote Sensing and GIS (3)	
Navigation and Airline Management (2)	
Satellite Communications (2) *	
Microwave Technique (2) *	
Computer Networks (3)	
Project III (3) *	
Multimedia	
Digital Image Processing (3) *	
Sound Signal Processing (3) *	
Multimedia Systems (2) *	
Computer Graphics (2)	
Virtual Reality and Enforcement Reality (2)	
Multimedia Production (2)	
Project III (3) *	
Master in Biomedical Engineering	
Medical Imaging Technology II (3)	Research methodology (2) *
Radiation Therapy and Nuclear Medicine (2) *	Advance Medical Imaging Technology (3) *
Biomedical Image Processing (3)	Medical Equipment Management (3) *
Medical Information Systems (3) *	Radiation Therapy Planning (2)
Biomedical Electronic Equipments II (2)	Functional recovery Therapy (2)
Digital Biosignal Processing(3)	Biomechanic and Application (2)
Radiation and Electrical Safety in Medicine (3)	Optical Biomedicine
Project III (3) *	Artificial Intelligence and Applications

Graduation (15)

Graduation Thesis (15)

Bachelor Degree in Electronics and Telecommunications
M.Sc Degree in (1) Electronic Engineering, (2) Communication Engineering, (3) Bio-Medical Engineering Research-oriented)

4-year Bachelor Degree in Electronics and Telecommunications

General Education (49)

- Algebra (4)
- Statistics (3)
- Analytics 1, 2, 3 (10)
- Physics 1, 2, 3 (9)
- English (6)
- Introduction of Computer Science (4)
- Social science and Politics (10)

Mandatory (49)

- Introduction to Electronics and Telecommunications Engineering (2)
- Data Structures and Algorithms (2)
- C/C++ programing (2)
- Software Engineering (2)
- Project I (2)
- Basic Practicum (2)
  - Electronic Devices (3)
  - Circuit Theory (3)
  - Analog Electronics 1 (3)
  - Digital Electronics (3)
  - Analog Electronics 2 (2)
  - Microprocessor (3)
  - Electronic Measurement (2)
  - Signals and Systems (3)
  - Information Theory (2)
  - Electromagnetic Field (3)
  - Anten and Propagation (2)
  - Digital Communications (3)
  - Digital Signal Processing (3)
- Project II (2)

Optional (15)

Electronics and Computer
- Operating Systems (3)
- Computer Networks (3)
- Cryptography (3)
- Fundamentals of Data Communications (3)
- Telecommunication Systems (3)

Communication Engineering
- Radio Communications (3)
- Telecommunication Systems (3)
- Fundamentals of Data Communications (3)
- Computer Networks (3)
- Cryptography (3)

Aerospace Electronics
- Data & Telegram Transmission (3)
- Localization & Electronic Navigation (3)
- Cryptography (3)
- Radio Communications (3)
- Telecommunication Systems (3)

Multimedia
- Multimedia (2)
- Computer Networks (3)
- Television (2)
- Fundamentals of Data Communications (3)
- Cryptography (3)
- Telecommunication Systems (3)

Biomedical
- Biomechanics (2)
- Human Anatomy and Physiology (2)
- Sensors and Measurement Techniques in Biomedicine (3)
- Biomedical Signal Processing Circuit (3)
- Medical Imaging Technique (3)
- Biomedical Electroni Equipment I (2)

Graduation Project

Graduation Internship (2), Graduation Project (6)

1) 3 minors: Electronic Engineering, Communication Engineering, Biomedical Engineering
2) Number in brackets are the number of credits
3) (*) is the mandatory course

1.5-year Master of Science

Master of Science (45) (Research-oriented)

Basic Courses (12-15)

Master in Electronics Engineering

Electronic Engineering (12-15)
- VLSI Design (3)
- Embedded System Design (3)
- Power Electronics (2)
- Analog IC Design (2)
- Research Project I (3) *
- Research Project II (3) *

Computer Engineering (13)
- Embedded System Design (3)
- Computer Architecture (2)
- Advanced Programing (2)
- Object-oriented Analysis & Design (3)
- Mobile Programming (2)
- Research Project I (3) *
- Research Project II (3) *

Master in Communication Engineering

Communication Engineering
- Communication Networks (2) *
- Microwave Techniques (2) *
- Mobile Communication Systems (2)
- Satellite Communications (2)
- Optical Communications (2)
- Telecommunication Network Planning and Management (2)
- Research Project I (3) *
- Research Project II (3) *

Aerospace Electronics (13)
- Avionics Information Networks (2) *
- Microwave Technique (2) *
- Satellite Communications (2)
- Satellite Navigation (3)
- Remote Sensing and GIS (3)
- Navigation and Airline Management (2)
- Research Project I (3) *
- Research Project II (3) *

Multimedia
- Digital Image Processing (3) *
- Sound Signal Processing (3) *
- Multimedia Systems (2)
- Computer Graphics (2)
- Virtual Reality and Enforcement Reality (2)
- Multimedia Production (2)
- Research Project I (3) *
- Research Project II (3) *

Master in Biomedical Engineering
- Medical Imaging Technology II (3)
- Radiation Therapy and Nuclear Medicine (2) *
- Biomedical Image Processing (3)
- Medical Information Systems (3) *
- Biomedical Electronic Equipments II (2)
- Digital Biosignal Processing(3)
- Research Project I (3) *
- Research Project II (3) *
- Radiation and Electrical Safety in Medicine (3)

Advance Courses (12-15)

Advance courses for all directions
- Advanced Digital Signal Processing (2) *
- Wireless Communication System Analysis and Design (2)
- Future Internet (2)*
- Time-Space Signal Processing (2)
- Cloud Computing and Edge Computing (2)
- System Modelling and Numerical Simulation Method (2) *
- Artificial Intelligence and Applications (3)
- Network Security (2)
- Advanced Information Theory and Channel Coding (2)
- Microwave Circuit Design (2)
- Research Methodology (2) *

Master in Electronics Engineering
- Advanced Digital Signal Processing (2)
- Hardware Verification (2)
- Computer Vision (2)
- Artificial Intelligence and Applications (3) *
- Complex Network and Applications (3)
- Research Methodology (2) *

Master in Communication Engineering
- Advanced Digital Signal Processing (2) *
- Computer Vision (2)
- Research Methodology (2) *

Master in Biomedical Engineering
- Advance Medical Imaging Technology (3)
- Medical Equipment Management (3) *
- Radiation Therapy Planning (2)
- Functional recovery Therapy (2)
- Biomechanic and Application (2)
- Artificial Intelligence and Applications (2)
- Optical Biomedicine
- Research Methodology (2) *

Graduation Project (15)

Graduation Thesis (15)

Data structure and Algorithms (2)	Algorithm and complexity, Linear list (stack, queue and linked list), Tree structure, sorting and search algorithm
C/C++ programing (2)	C/C++ program structure, function and operators, array, pointer, class and object; object-oriented programming, data structure (Stack, Queue, Linked List, Tree), Search and sorting algorithm
Software Engineering (2)	Introduction to basic knowledge of software engineering, fundamental software development methodologies, and fundamental phases in development of a software product. Overview of project management. To explore each phase in software development such as requirement discovery, analysis and design.
Electronic Devices (3)	Introduction to fundamentals of construction, principles, characteristics and parameters of electronic devices which consists of semiconductor diodes, bipolar junction transistor, field effect transistor, analog integrated circuits, digital integrated circuit,photo-electronic devices and it's applications
Circuit Theory (3)	Kirchhoff's laws, resistive circuits, equivalent circuits using Thevenin-Norton theories, nodal method, loop method, sinusoidal analysis, phasors, Circuit analysis via Laplace transform, transient analysis, poles and zeros of network functions, two-port networks.
Analog Electronics (3)	Diode application, BJT/FET small signal amplifier, Coupling, Frequency response, Feedback, Power Amplifier, Operational Amplifier and its application, Tutorial of Design and Implementation of electronic ciruits.
Digital Electronics (3)	- General concept: counting and representation systems, Boolean algebra, basic logic gates, manufacturing technology (TTL, CMOS, ...) - Design of combinational logic circuit: Cover Karnaugh, Quine McClusky, hazard, basic circuits (encoder, decoder, ALU, MUX, DEMUX, Adder ...) - Sequential logic circuit design: flip-flop types, FSM (finite state machine Moore, Mealy), implement FSM by FF, basic circuits (translation register, counter, queue ...) - Designed using CAD: programmable microchips (PAL, PLA, CPLD, FPGA), VHDL hardware simulation language (or Verilog)
Analog Electronics 2 (2)	- Nonlinear function circuits using Operational Amplifier (OPAM) - DC supply circuits - Harmonic oscillation circuits - Amplitude (AM), Frequency (FM) and Phase (PM) modulation circuits - Amplitude, frequency and phase demodulation circuits - Frequency conversion and Phase Lock Loop (PLL) circuits - Analog/Digital (A/D) and Digital/Analog (D/A) conversion circuits
Microprocessor (3)	Introduction to microprocessors: function, structure and working principle; instruction set, addressing modes, memory and IO maps. Assembly programming for 80x86 microprocessors. Interfacing with memory and IO devices. Interrupt and interrupt controller; DMA, real-life microprocessors Intel, Motorola GPP, DSP, microcontrollers (AVR, 8051, PIC...)
Electronic Measurement (2)	Introduction of electronic measurement, general principles for electronic measurement of electrical and non-electrical quantities, electrical parameters of measurement, and processing of the measurement results. Different types of measurement errors, processing methods for minimizing errors, the working range and resolution of the measuring equipment, the quality of the measurement devices; Measurement and observation the parameters or characteristics of the electrical signal as well as observation of different figures of signals, the parameters of voltage, current etc.

Digital System Design and Synthetic (2)	Process of designing digital ICs using HDL Verilog hardware description language. - Test digital IC function - Describe combinational logic circuit, sequencial logic circuit by Verilog. Digital circuit design by using FSMD and ASMD methods. Synthesize digital circuits from HDL language into logic gates. Analyzing speed and time of digital circuits. Optimizing digital circuits. Exercise of digital circuit design
VLSI Design (3)	- Introduction about IC design:review of fabrication technology. - Design method: use computer help, basic element fabrication, library creation ... - Basic circuits: NOT, NAND, NOR, ADDER, ..v.v., Mirror circuit, differential circuit, amplifier circuit, comparator circuit. - Design software: introduce Cadence, Verilog, HSPICE. - Digital IC design: introduction. - Analog IC design: introduction - A project of a digital or analog IC design.
Analog IC design (2)	Aiming to provide knowledge about analysis, simulation and design of analog CMOS ICs: - Describe MOS and BJT active component models - Describe some attention in the layout -The basic circuit: line mirror, differential amplifier, current source and simple voltage source -Analysis and design of simple current and voltage source circuits -Bandgap circuit -Compare line -Circuit sampling and keeping -Analysis of differential amplifier circuit design -The basic IC models: source IC, ADC, DAC, .. -Project: analyzing an analog IC design
Embedded System Design (3)	Concept of embedded system, microprocessor used in embedded system, memory used in embedded system, peripheral device and peripheral device connection, real-time operating system
Power Electronics (2)	Power electronic components; DC-DC, DC-AC, AC-DC power conversion circuit. Circuit model using DC-DC transformer, charge balance on the capacitor, on the coil; Calculation of approximations for small voltages and currents. Continuous / intermittent operation mode. Circuit model, circuit performance with non-ideal components
Computer Architecture (2)	This course introduces to students the history of computer technologies and basic modules in a computer systems, such as memory ((ROM, PROM, EPROM, Flash, EEPROM, FeRAM, SRAM, SBSRAM, DRAM, FPDRAM, EDO DRAM, SDRAM, DDR-SDRAM, RDRAM) and memory organization (cache, virtual memory); microprocessor: pipelining, superscalar, VLIW, vector computer, multithread; peripheral devices: intefaces (RS232, UART, USB, IEEE 1394), buses (ISA, PCI ...), Hard disk (RAID, SCSI), CD, CD-WR, DVD, monitors, printers
Advanced Programing (2)	Advanced Java Programming: . Introduction to Java and Programming Environment . Objects, Classes and fundamental programming . Multithreading and networking . Database Connectivity . Securities . Android mobile device pprogramming
Object-oriented Analysis & Design (3)	Introduction about design methods, system analysis (waterfall, parallel, rapid application development ...), object-oriented analysis and design, UML, case studies (ATM, digital audio recorder)
Communication Network (2)	Introduction to communication networks; telecommunication network functions; time switch; space switch; hybrid switch; matrix switch; interconnect networks; digital switching systems; basic signalling; ATM switch; MPLS; NGN architecture; softswitch.
Microwave Technique (2)	Introduction: microwave engineering and applications. Microwave transmission line: concept, model, parameters, lossless microwave transmission lined terminated with a load and connected to a source. Impedance matching techniques: narrow-band and wideband impedance matching techniques. Microwave network analysis: ABCD matrix, Z, Y matrix, S matrix, signal flow graph. Microwave circuits, component, modules: active and passive component, filter, cavity, amplifier, LNA...

Artificial Intelligence and Applications (3) *	AI overview including history, classification and application. Basic machine learning techniques, deep learning based on Python language through practical applications related to machine vision, speech recognition, and natural language processing based on industrial design/research tools such as TensorFlow, Caffe, Torch/ PyTorch runs on CPU / GPU. The AI trend on the circuit is introduced and comparison of the development potential with the traditional method of using the cloud. Circuit technologies from Arduino, Raspberry, Nividia, Intel, Google and Xilinx firms are introduced and examples of designing neural networks, convolutional neural networks, regression neural networks or Internet of things on embedded devices is the focus of the subject.
Real-time Systems (2)	Basic concepts and requirements for real-time systems, different real-time levels (hard/firm/soft real-time). Algorithms for scheduling real-time tasks, control reception and rejection. The module also mentions architecture and design of commercial real-time operating systems (RTOS) (QNX, VxWorks, ..vv) and open code (RTAI/RTLinux) as well as real-time middleware (real-time middleware for embedded systems. Students are introduced to real-time database with synchronization, query and transaction functions. Finally, the module will introduce typical applications of real-time information systems including multimedia, real-time monitoring and control using sensors and actors / actuators, and control systems. in production as well as vehicle engineering.
Distributed Systems (2)	This module presents distributed system architectures, requirements for system design, multi-processor structures, multi-computers, computer networks and layered, object-oriented distributed architectures (objecte- based), data-centered, and event-based. Students are introduced to the information mechanism in the distributed system, calling the remote procedure call, activating the dispersal procedure (remote method invocation), inter-process communication and multipath. The module also mentions logical synchronization in distributed systems, election algorithms and mutual exclusion aside from distributed transactions. Concerning the reliability of the system, students get used to the process error resistance, reliable group communication and error recovery mechanism. Finally, peer-to-peer presentation (p2p) as a distributed application effectively supports data sharing and multimedia streaming with a large number of users.
Advanced Digital Signal Processing (2)	Signal detection and system parameter estimation (signal detection and system parameter estimation [1,2]) and application - Theory of Adaptive Filter Theory [3] and application + Filter least square + Wiener adaptive filter + Kalman filter + Least mean square LMS (Least mean square) algorithm - Method of designing application number filters in real time
Hardware Verification (2)	Techniques and methods for testing digital hardware design. Test hardware based simulation. Check form design. Programming to support design testing. Architecture and operation of the simulator. Testbench. Check, confirm, and test situations Decision graph. Equivalent testing and symbol simulation. Check the model and calculate the symbol.
Computer Vision (2)	The overall design of a computer vision system comes from image acquisition, image analysis, object detection in images and recognizing object meaning through machine learning techniques. This module requires learners to be able to program C ++ or C # and use Matlab software. Teaching methods will be based on problem-based learning (Problem Based Learning), access to the basic content to design computer poetic systems, specifically: 1. Read the image from the 2D color image or the Depth image image. 2. Convert and Upgrade photos to facilitate image separation 3. Separate photos and separate objects of interest 4. Extract selected features 5. Create templates 6. Design pattern recognition system based on machine learning techniques
Wireless Communication System Analysis and Design (2)	Radio communication system; radio standards; SISO and MIMO radio channel models; architecture of radio systems; analyzing calculations and designing linear high-frequency super-elements; analyzing and calculating the design of nonlinear ultra-high frequency elements; linearization techniques; antennas transmitting waves in radio communication systems; analyzing, calculating, designing transmitters, receivers and radio communication routes.
Future Internet (2)*	Architecture and mechanism to ensure quality of service (QoS) in the Internet: available resources, control connection acceptance, scheduling algorithms; IntServ and DiffServ models. - Experience quality concept (QoE); the relationship between resources and QoE; Convert from QoE to QoS and network resources. - Software controlled network (SDN)
Time-Space Signal Processing (2)	This module introduces the knowledge of the domain of spatial and temporal signal processing, including: Problems of channel and time domain characteristics, multi-antenna system model MIMO transmitter and receiver, MIMO channel system model, basic space and time coding methods (Alamouti's STBC encoding and decoding scheme). The combination of MIMO technology with intelligent antenna techniques, orthogonal OFDM modulation techniques. Applications of techniques to process space and time signals in advanced information systems.
Cloud Computing and Edge Computing (2)	Service model and business model of cloud computing services (SaaS, IaaS, PaaS) - Infrastructure of cloud computing: data center architecture - Virtualization concept in boundary and cloud computing; server virtualization concepts: hypervisor and virtual machine; container; common virtual machine and container management platforms; - Concept of network function virtualization; use SDN to network virtualization in cloud computing and boundary computing; - The foundation of cloud computing: OpenStack. Etc.

Signal and System (3)	- Definitions, classifications and operations of signals, systems. - Representation and analysis of LTI systems in time and frequency domains. Fourier series and Fourier transforms of continuous and discrete-time signals and systems. - Laplace transform and z-transform, and their applications to analyze LTI systems. - Amplitude modulation / demodulation. Signal space and the principles of digital communications.
Information Theory (2)	Basic concepts of information theory, entropy, channel capacity, source coding, channel coding.
Electromagnetic field (3)	- The static electric field: Introduction on electrostatic field. Basic properties of the static electric field. - The static magnetic field: Basic laws of conduction current, Ampere's law, basic properties of the static magnetic field. - Time-varying electromagnetic field: Maxwell equations. Energy of electromagnetic field. Poynting theorem. Poynting vector. - Plane electromagnetic wave: Properties and propagation of harmonious plane wave, plane wave in perfect dielectric environment, harmonious plane wave in semiconductor and conductor environments, reflection and refraction, skin effect. - High frequency propagation line - directional line. Waveguide, delay line, parallel line, coaxial cable, optical fiber propagation line.
Anten and Propagation (2)	Antenna: review of electromagnetic radiation, the characteristics of a radiation source (antenna) .Introduction to radiation system. The basic techniques to control the characteristics of the radiation system. Present some common antennas (principles, composition, electrical contact, applications) and antenna design methods in order to achieve the required. The propagation: Presentation of electromagnetic wave propagation method in space. Calculate the electromagnetic wave energy at the collection point. Study the influence of the ground, the troposphere and the ionosphere on wave propagation. Introducing the computational model of wave propagation
Digital communication (3)	A/D and D/A coversion; sampling theory; properties of digital channels; impact of AWGN on signal quality; Nyquist criteria; raised-cosine filter; signal recovery, matched filter; line coding. Baseband modulation; digital modulation: PSK, ASK; FSL and QAM. I/Q modulation.
Digital signal processing (3)	Introduction of signal and discrete system, Fourier transform and Discrete Fourier transform, FFT algorithms and implementations on hardware, FIR and IIR filter and systhesis method, Applications of digital signal processing in image/sound signal processing
Operating System (3)	Overview of the operating system: components of the operating system, single-task operating system, multi-task OS, real-time OS. - The concept of process - management, coordination, process synchronization. - Concept of deadlock, conditions of congestion occurrence - resource management and anti-congestion. - Memory management: organization, memory hierarchy. paging, segment. Virtual memory management. - file management, in / out management, external memory management. - Operating system security. - Several typical operating systems: WINDOWS, DOS, LINUX.
Computer Networks (3)	OSI model; Tranmission Media using on Computer networks and its characteristics; link layer mechanism & technique, media access controls; Layer 3 functions and routing protocols; Layer 4 reliable protocols and mechanisms; IP, TCP, UDP and other supporting protocol on computer networks and Internet.
Encryption Theory (3)	The module presents symmetric key encryption method, public key encryption method, cryptographic, cryptosystem and pseudo-random sequence generation problem, Elgamal digital signature scheme and standard ECDSA digital signature, complexity processing and data complexity of a specific attack on the cryptosystem; security features of encryption methods, linear cryptanalysis, differential cryptanalysis and security code building problems for applications.
Data transmission (3)	System modeling methods, service systems and queuing theory, reservation systems, network of queues. Methods for performance evaluation of computer and network systems. Routing algorithms. Flow and congestion control algorithms and performance evaluation.
Telecommunication Systems (3)	Introduction: analog and digital sources, overview of telecommunication systems. LOS microwave communication systems: concept, system architecture, propagation, link budget design. Satellite communication systems: concept, fundamental knowledge, system architecture, link budget, application of satellites. Mobile communication systems: cell concept, frequency reuse, standards, GSM architecture and applications, WCDMA and LTE, LTE-A. Optical fiber communication systems: concept, physical phenomenon of light in optical fiber, light emitting devices, photodiode, system, new technologies, link budget design. High frequency communication systems: concept, wave propagation, system architecture.

Mobile Communication Systems (2)	This course provides students acknowledges about systems GSM. GPRS, 3G (UMTS and CDMA 2000): functionalities, fundamentals of function subsystems, channel structure, handover processes, power control, network planning. The road map from 2G to 2,5 and 3G. This course also provides some limits of 3G networks and requirements of 4G networks. Some technologies can be applied in 4G such as MIMO, smart antennas, etc.
Satellite Communications (2)	Introduction: system structure, parameters, movement and orbit equations, satellite orbit: LEO, MEO, HEO, GEO budget link, G, EIRP, G/T, etc; satellite station, earth station, modulations, multiple access; satellite systems: geostationary, local or global, mobile, network, VSAT, marine satellite systems, mobile system, positioning system, VINASAT-1 and VINASAT 2
Optical Communication (2)	- Optical devices: Laser, receiver, Diod PIN, APD, DFB, optical fiber amplifier EDFA, optical cable, physical property, signal degradation: attenuation and dispersion, dispersion compensation. - Optical network: Long-haul, Metro, Access (EPON, APON). Components in optical network: OLT, ONU, ADM, OXC, DCS .v.v. PDH, SONET and SDH. Optical switch, MEMS. WDM, IPoWDM, SDL Technology. Optical nano structures: filter, dispersion compensator,..Design of a optical communication system.
Telecommunication Network Planning and Management (2)	Optimal Design and construction of telecommunications networks; topology design, calculation of traffic. Telecommunication Network Management
Avionics Communication Networks (2)	Introduction to the ACN: system architecture, standards, applications. This course provides students with basic knowledge on ATM, ATC and services in Vietnam
Satellite Navigation (3)	The basic principles of satellite navigation. Properties of GPS satellite signals, data acquisition, correction and demodulation. Interference, multi-path and flashing phenomena. Differential GPS, built-in GPS with network and other supporting devices. Galileo and other satellite navigation systems.
Remote Sensing and GIS (3)	Introduction of basic concepts of remote sensing, remote sensing systems and geographic information systems (GIS). Using electromagnetic radiation in remote sensing, structure of remote sensing systems, remote sensing satellites, overview of remote sensing data. Remote sensing image interpretation and analysis with a focus on visual expression and image processing techniques. Image surveying, a technique used to determine the geometric characteristics of objects through aerial photographs or satellite images and its application in building map. Geographic information system (GIS) including system structure, format and data structure, processing and combining geographic information data.
Navigation and Airline Management (2)	Introduction to navigation: navigation methods, navigation systems used in aeronautics. Concepts of air traffic management, air traffic control, traffic congestion management, departure / arrival management, flight information, flight information region, control of take-off, landing and en-route regions, airspace access and management.
Digital Image Processing (3)	This course provides students with fundamentals of DIP and frequently used DIP algorithms such as: image transform, image enhancement, edge detection, segmentation ... Students are guided to use MATLAB and programming languages (C/C++/C#) to implement the studied DIP algorithms and develop related applications.
Sound Signal Processing (3)	Introduce to student about knowledge of sound processing techniques, advanced voice compression and audio compression standards. Content: Theory of basic characteristics of sound. Voice coding methods (waveform encoding, parameter encoding, hybrid coding). Voice coding standards and applications (G.711, G.721, G.726, G.728 ...). Sound coding method in frequency domain. Advanced audio compression standards (MPEG1 Audio, MPEG2 Audio, MPEG2 AAC, Dolby AC-3, MPEG4 Audio).
Multimedia Information System (2)	- Multimedia protocols: VoIP, SIP, RTP, RTCP, IMS (IP multimedia Subsystem), RTSP, H.320, H.323 - Streaming technologies and systems: WINDOWS Media, QuickTime, Real. - Videoconferencing technologies. - Introduction to service quality on multimedia networks. Building systems and developing applications on multimedia networks.

System Modelling and Numerical Simulation Method (2) *	Part I introduces transmission channel modeling methods (filter usage method, Rice method and Monte carlo method), network traffic and load model, signal transceiver system. Part II introduces the simulation and analysis of digital systems through computers: signal discrete, signal design and optimization methods, modulation and coding using computers, methods simulating probability processes. Methods for evaluating the quality of simulation systems through bit error functions, mean square error function, signal delay, etc. Methods for assessing and minimizing digital system complexity before testing design in practice.
Network Security (2)	Identify threats in the network environment: viruses, malware, DDoS, man-in-the-middle, worms, etc. - Assess the risks and security vulnerabilities of application ports, network services, source code. - Basis for security encryption: security encryption methods and algorithms - Authorized and authentic mechanism and architecture (AAA) - Security methods in communication protocols: IPSec, TLS, SSL. - Network security devices: Firewall, IPS, IDS
Advanced Information Theory and Channel Coding (2)	Determination of Bayer theorem conditions (Conditional probability with Bayes' Theorem) - Symmetric binary channel model (Binary symmetric channel) [1] - Removable discrete channel model (discrete memoryless channel) [2] - Calculation of channel capacity with noise [3] - Theory of information loss (rate distortion theory) [4] Advanced channel encoding: - Viterbi encoder and soft-coding algorithm (Viterbi algorithm soft output (SOVA)) - Turbo encoding and decoding - Galois field (Galois field) - LDPC (low-density parity-check codes) codes and applications - Code BCH and application - Reed-Solomon code and application
Microwave Circuit Design (2)	Principle of ultra-high frequency: transmission models, parameters of network analysis, impedance coordination techniques, basic technical parameters and evaluation methods - Introduction and application of ADS (Advanced Design System) super high frequency simulation software - Design of passive ultra-high frequency elements: low-pass filter - high throughput - band gap - strip barrier, power divider, micro strip antenna, ... - Positive super high frequency elements design: LNA low noise amplification, power amplifier, frequency multiplication, frequency mixing, modulation / demodulation, ... - Manufacturing test and testing designs

Radio Communications (3)	This course focuses on physical layer and MAC layer for radio communications, is the basis of other courses including mobile communications, satellite communications, broadcast technology, navigation positioning, microwave engineering and antenna. Radio system, structure of radio system: the structure of receiver and transceiver Theory of radio channels: multi-path diversity transmission model, Doppler Effect, channel model depending on frequency and time, pathloss model, mathematic model of radio channel, radio channel simulation methods. basic knowledge on radio communications including: - Theory of radio channel propagation - Types of interference in radio communications, channel equalization methods, noise reduction - Radio channel capacity - Receiver structure - Common modulation methods for radio communications - IEEE and ETSI standards for radio communications
Data &Text Transmission (3)	This course provides students knowledge about basic of data communications and their applications in aeronautical area. Features and requirements of data communications, network architecture, data communication technologies, aeronautical data communication and message switching and data link application G/G and A/G.
Localization & Electronic Navigation (3)	Introduction to the radar system: system architecture, operation and applications in Air Traffic Management; Sonar and applications; GNSS and Location based services.
Multimedia (2)	Introduction to fundamentals of compression: Entropy, RLC, VLC, Huffman. Video and audio compression standards: MPEG-1, MPEG-2, MPEG-4, MPEG-7 Video, H.263, H.264; MPEG-1, MPEG-2 Audio, JPEG), Model-based Video Coding (MBVC). Digital Media: CDR, CDRW, DVD, Digital Camera, Video Camera, WebCam. Media Content Creation and Publishing. Multimedia networks: VoIP, SIP, RTP, RTCP, RTSP, H.323.
Television (2)	Theory of light and color, RGB, YUV, .v.v.Principle of analysis and synthesis of television images. Image signal form, sync signal, vertical/horizontal scan, sound, color signal, dazzling signal, etc. Principle of color television: PAL, NTSC, SECAM color television systems. Principles and diagrams of color TV blocks. Types of color recording tubes. Video transmitter. TV studio, television techniques. CATV TV, TH satellite. Digital television systems: DVB-T, DVB-C, DVB-S, MMDS. Introduction to digital modulation in television: QAM, COFDM. Digital Set-Top-Box

Computer Graphics (2)	Basics of color, luminance, scanning, image, pattern, texture (texture), graphic effect (effect); - Foundations of graphic mathematics and graphic geometry transformation; - Modeling and 3D graphics: conversion, presentation and interaction; - Graphic animations; - Graphic libraries: OpenGL, WebGL, HTML5, DirectX, WPF; - Graphics hardware: GPU, graphics card; - Application of graphics: games, animation, design, 3D planning.
Virtual Reality and Enforcement Reality (2)	Basics: real-time simulations, 3I principles (Interaction, Immersion, Imagination), Tracking, Mapping; - VR / AR / MR system structure: input (mouse, keyboard, sensor, HMD, etc.), output (vibrator, audio, haptic / force feedback devices, texture, etc.), UI; - Interaction in VR / AR / MR (Selection, Manipulation, Isomorphic / non-isomorphic, Exocentric / egocentric interactions) and methods of execution (distant / direct interaction, Physical / virtual controls, Gesture interactions, Function to emotions) - Navigation technique (Navigation): Physical locomotion, Target based techniques, Steering; - Interface MR: Menu directions, Haptic control panel; - Tool to develop VR / AR / MR application system: Apple ARKit, Google ARCore, MS HoloLens.
Multimedia Production (2)	Process of multimedia content production; - Methods and tools for creating and compiling hypermedia authoring content; - Environmental programming development (Adobe, HyperPublish Pro, MatchWare Mediator) multimedia content; - Media mark-up language; - Multimedia database, multimedia content storage and search; - Digital rights management (DRM) control; - Techniques and systems videography and cinematography.