Transilvania University of Braşov, Romania

Study program: Applied Electronics

Faculty: Electrical Engineering and Computer Science

Study period: 4 years

1st Year - 1st Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Communication Skills	ETTI101	3	1	2	-	-

Course description (Syllabus): Interpersonal Perception; Communication - general issues; Verbal and nonverbal communication; Communication from the transactional analysis perspective; Communication in conflict situations; Ethics and etiquette in communication; Personal development within the organization
Seminar: The topics of the lectures are taken again in the form of practical examples; Also, are exposed details and completions for topics of the lectures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Applied Informatics I	ETTI102	4	1	-	2	-

Course description (Syllabus): Use of Computer Hardware and Software; Internet links: packet switching, modes of access; Internet links: Addressing in Internet (IP address, port, proxy servers), client server architecture, domain name and DNS service; E-mail service: Main features, Access modes (POP3, IMAP), SPAM, Mailing Lists; WWW service: Hypertext, URL, HTML, CSS, XML, interactive web pages (CGI, ASP, PHP, JavaScript), portals, search engines, cookies; FTP service: FTP service operation, peer-to-peer networks; Security in Internet: Firewall and packet filtering, public and private key cryptography, PGP (Preety Good Privacy), secure web servers, VPN (Virtual Private Network).
Laboratory: Working under the Linux O.S.; File-system; Control of the work environment; Filtering messages; Programming in shell; WWW; E-mail Service; Files transfer; Web pages; Web Hosting

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Mathematical Analysis	ETTI103	6	3	2	-	-

Course description (Syllabus): Relations. Ordered sets. The set of real numbers; Sequences and series of real numbers; Convergence criteria for series; Real functions: limits, continuity, derivatives; Taylor's formula; Riemann integrability. Improper integrals; Sequences and series of real functions. Power series; The Euclidian space R^n. Functions of several variables; Limits, continuity and differential calculus on R^n. Extreme values of differentiable functions of several variables; Parameter-dependent integrals. Euler's functions; Line integrals. Multiple integrals. Integral formulas.
Seminar: The topics of the lectures are taken again in the form of practical examples; Also, are exposed details and completions for topics of the lectures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Linear Algebra, Analytical and Differential Geometry	ETTI104	7	3	2	-	-

Course description (Syllabus): Vectors in two- and three-dimensional Cartesian coordinates. Vector products and applications; Line and plane in space, angles, and distances; Coordinate transformations in plane and in space; Vectoral spaces, subspaces; Radix. Transferring a number from one radix to another; Linear binary codes. Matrix generators, application coding; Boolean algebras; Boolean functions; Minimisation of Boolean functions - Quine-McCluskey

method, Karnaugh map, Reed-Muller structures, Post structures Post; Elements of graph theory. Graph representation in computer memory.
Seminar: The topics of the lectures are taken again in the form of practical examples; Also, are exposed details and completions for topics of the lectures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computers Programming and Programming Languages	ETTI105	5	2	-	2	1

Course description (Syllabus): C++ syntax and semantics; Arithmetic expressions, function calls and outputs; Entries in the program. Writing applications; Conditions, logical expressions and selection control structures; Loops; Functions; Tables; Other control structures: switch, do-while, for; Scope. Lifetime. Namespace; Pointers; Function templates. Exception handling.
Laboratory: Working in C and C++ programming language

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer Assisted Graphics	ETTI106	3	-	-	2	-

Course description (Syllabus): Graphics theory techniques; Organizing a work session in Auto CAD 2000; General aspects of computer graphics, two-dimensional and three-dimensional modeling in AUTOCAD; Realistic representations of 2D and 3D assemblies, using geometric modeling software (CAD); Making design objects by drawing commands; Dimensional representations: interactive and generative techniques, organizing the virtual representation space, graphical objects - properties, scales of representation, virtual paper formats; Concepts of blocks, attributes; Creating three dimensional models: geometric principles and parametrical type engineering principles based on characteristics, techniques of sketching and constraining drawings, forms generation space.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English 1	LE01	2	1	1		

Course description (Syllabus): Introduction & Objectives; Classification of verbs; Tenses of the indicative mood; Tenses
Seminar: Electrical and electronics engineering ; Careers in electronics; Electronics; Verb and Verb phrase

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical Training I	EF01	1	-	1		

Course description (Syllabus): Techniques with and without the ball, football and / or basketball; Individual and collective tactical actions in attack and defense in football and / or basketball; Exercises and effective learning complex structures, strengthening and perfecting the game of football and / or basketball; Technical structures in collaboration between 2-3 players in attack and defense in football and / or basketball; Acquiring rules of the game of football and / or basketball; Two teams match 5 x 5 and / or 3 x 3.

1st Year - 2nd Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Special Mathematics	ETTI209	4	2	1	-	-

Course description (Syllabus): Differential Equations **(**Mathematical methods which lead to differential equations, Equations of the first order and degree. Cauchy Problem. Existence and uniqueness Theorem, Separation variables. The homogeneous type. Linear equations. Bernoulli equations. Exact equations. Integrating factors. Linear equations of higher degree, with variable coefficients and with constant coefficients); Differential systems **(**Linear systems with constant coefficients, Prime integral. Symmetric systems. Stability Theory. Basic concept. Stability of linear and non-

linear systems); Complex Functions **(**Complex number. Complex plane. Sequences. Series. Elementary functions. Continuity, derivability, Cauchy-Riemann conditions. Complex Integral. Cauchy's Integral Formulas. Taylor and Laurent series. Residues. Applications); Laplace Transform (Definition, properties and theorems. Inverse of the Laplace Transform. Applications in solving differential and integral equations). Fourier series **(**Basic results on Fourier series. Fourier Transform. Applications.) Z – Transform **(**Basic results ans applications)

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
The Equations of Mathematical Physics	ETTI210	6	3	2	-	-

Course description (Syllabus): Fundamental equations of the electromagnetic field. Functions and eigenvalues for the Laplace operator. Wave propagation equation. Boundary and initial conditions. Equations with separable variables. Homogeneous and inhomogeneous equations. Fourier's method. Higher order differential equations. Operational method. Nonlinear equations. Nonlinear circuit applications. Applications of derivatives. Gradient Operators. Divergence. Rotor. Models for capacitors, coils, dc motors, etc. Equations with partial derivatives of second order. Equation of heat propagation. Boundary and initial conditions.

Seminar: Applications and examples of linear algebra. Systems of linear equations. Incompatible equation systems. Comprehensive applications and examples. Calculation of electrical quantities. Applications for solving nonlinear equations. Graphic method. Solving differential equations from electronic circuits in transient mode (direct integration method, spectral analysis method, Duhamel integral, operational method). Checking Kirchhoff's formulas. Applications and examples of derivative calculations. Use of the oscilloscope for practical demonstrations. Applications of derivative calculation for error propagation. Determination of some parameters using the slope method - application in the laboratory

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Basics of Electrotechnics	ETTI211	4	2	1	-	-

Course description (Syllabus): Introduction: mathematical models and methods, phenomena, applications; Electrostatics - charge, force, field, potential, voltage; Electrodynamics: principles and relations; Electromagnetic fields. Maxwell equations - the vector field formalism; Electromagnetic waves. Propagation - media and modes; Lumped and distributed circuit elements; Kirchhoff's laws; DC and AC circuits with discrete circuit elements; Laws and theorems for the functioning of electrical apparatus and machines.

Seminar: Lumped and distributed circuit elements; Kirchhoff's laws; DC and AC circuits with discrete circuit elements.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Theory of Probabilities and Mathematical Statistics	ETTI212	4	2	1	-	-

Course description (Syllabus): Probability field; Probabilistic schemes; Random variables; Numerical characteristics of random variables; Random vectors; Characteristic function; Theory of selection. Selection. Mean data distribution and selection dispersions; Theory of estimates; Methods for estimates determination; Testing statistical hypothesis.

Seminar: The topics of the lectures are taken again in the form of practical examples. Also, are exposed details and completions for topics of the lectures.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physics	ETTI213	6	3	1	1	-

Course description (Syllabus): Oscillations and waves; Electromagnetism; Electromagnetic waves. Optics; Notions of quantum mechanics and physics of the atom; Solid State Physics and Semiconductor; Semiconductors at thermal equilibrium.

Laboratory: The topics of the lectures are taken again in the form of practical examples in different laboratories rooms: laboratory of electricity, laboratory of optics, laboratory of atomic and molecular physics, laboratory of solid state physics

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Object Oriented Programming	ETTI214	4	2	-	2	-

Course description (Syllabus): Classes. Data abstraction; Operators overloading; Class inheritance; Polymorphism; Class templates; Standard Template Library; Processing strings; Standard C ++.
Laboratory: The structure of a C++ class; Class constructor, getter and setter functions; Constructors using arguments with default values; Composition of classes; Operators overloading; Class inheritance; Constructors and destructors; Virtual functions and polymorphism; Class Templates; Standard Template Library; Consolidation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English 2	LE02	2	1	1		

Course description (Syllabus): Electronic components; Analogue and digital electronic circuits; Telecommunications; Telecommunications operation principles; Communication networks; Telecommunications systems; Data transmission and computer networks.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical Training 2	EF02	1	-	1		

Course description (Syllabus): Technical basic liaison steps and aerobic; Technical structures for labor education and elasticity of muscle; Technical education structures joint mobility; Methodical and practical skills composing and teaching an aerobics maintenance complex; Methodical and practical skills to compose a set aerobic sports; Skills and habits related to the use of methods in educating motive bodybuilders; Skills related to correct body attitude, and correcting poor attitudes.

2nd Year - 1st Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Measurements in electronics and telecommunications	ETTI301	4	2	0	1	0

Course description (Syllabus): Basics of Measurements: accuracy, precision, resolution, reliability, repeatability, validity; Sensors and Actuators, Signals and measurement; **Bridge Measurement**: DC bridges; **Electronic Instruments for Measuring Basic Parameters**: Amplified DC meter, AC Voltmeter; **USB instrumentation**; Remote laboratories and modules. **Circuit general laws and devices**; Quadripoles; Signal amplifiers; **Measurements methods**; **Oscilloscope measurement Techniques**; Special Oscilloscopes – Storage Oscilloscope, Sampling Oscilloscope; Signal Generators.Signal Analysis: Wave Analyzer, Spectrum Analyzer. **Frequency Counters:** Simple Frequency Counter; **Digital Data Acquisition System**; Interfacing transducers to Electronics Control and Measuring System. **Introduction to Computer-Controlled Test Systems**.: EEE-488 GPIB Bus; LXI systems.Synthetic instruments. Laboratory: Introduction to measurements and measuring methods; Practical skills with measuring equipment and systems; Computer-aided measurement systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Signals and Systems I	ETTI302	6	3	1	2	0

Course description (Syllabus): Fourier analysis of signals; Sampling; Random variables (probabilities, random variables, probability density functions, cumulative distribution functions, distributions, statistical moments); Pairs of random

variables; Random signals; Signal filtering (ideal low-pass filter, ideal band-pass filter, filter design, statistical analysis of input-output dependency); Signal detection; Parameters estimation; Integral transforms (definition, properties, the Karhunen Loeve transform); Signal quantization.
Seminar: Fourier series; Fourier transform for signals of interest; Properties of Fourier transform; Continuous random variables; Discrete random variables; Theorem of mean; Pairs of random variables; Random processes; The Wiener-Khinchin theorem; Signal filtering (convolution theorem); Signal detection; Parameter estimation.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electronic Devices	ETTI303	6	3	2	1	-

Course description (Syllabus): Functional introduction in electronic devices - Simple models and applications; Elements of semiconductor physics; Diodes; Bipolar transistors; Field effect transistors; Optoelectronic devices; Multi-junction devices; Miller theorem; Methods of open-circuit and short-circuit time-constants
Seminar: Introduction – main concepts of electrical engineering applied to electronics – voltage divider rule / current divider rule; Thevenin equivalence; Norton equivalence; Problems – applications of electronic devices, on various models and equivalent schemas, in DC & AC (small signal) calculation of simple circuits with two-ports.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
JAVA Programming	ETTI304	5	2	-	2	-

Course description (Syllabus): Introduction; The JVM mechanism; Java and OOP; Collections; I/O for Java; Threads; Applets; Graphical user interfaces; Communication with Data Bases in Java.
Laboratory: Applets development; GUI development.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Applied Informatics II	ETTI305	3	2	-	-	1

Course description (Syllabus): Computer systems architecture. Computer networks. Operating systems. Collaborative platforms and cloud computing for application development Getting started with embedded systems and their programming Introduction to Visual Programming. History, strategies in visual programming, classification of visual programming languages. Examples of visual programming languages. Arduino platform. Platform programming. Arduino Web Editor, Arduino Desktop IDE, Arduino Snap!

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Spice Models	ETTI306	3	1	-	2	-

Course description (Syllabus): Creating a Circuit Design with Capture; Understanding the SPICE Models Description; Using PSpice to Simulate the Circuit; Making and Editing Capture Parts; Importing the Design into Layout; Making and Editing Layout Footprints
Laboratory: Drawing circuits using OrCAD Capture; DC Analysis; Transient Analysis; Frequency Analysis; Load an existing project and editing circuits; Circuits preparation for making PCB; Automatic routing; Creating and editing a symbol; Creating and editing a footprint; Associate SPICE models to created symbols

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
CAD Techniques in the Design of Electronic Modules	ETTI307	3	1	-	2	-

Course description (Syllabus): Computer-Aided Design and the OrCAD Design Suite; Printed Circuit Board Fabrication; Project Setup and Design in Capture; Using PSpice to Simulate the Circuit; Designing the PCB with Layout; Postprocessing and Board Fabrication

Laboratory: Project Setup and Design in Capture

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English Language III	LE03	2	1	1	0	0

Course description (Syllabus): Websites. Language work: Giving advice. Reading: Understanding the writer's purpose; Interview: Webpage Creator. Word study: definitions and collocations; Communications Systems; Computing Support. Diagnosing a fault and giving advice on technical problems.
Seminar: Exchanging information. Evaluating; Exchanging information. Advising; Exchanging information to complete a diagram. Describing a system.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical Training 3	EF03	1	-	1		

Course description (Syllabus): Game without the ball and foot hitting the ball; Mini football; Dispossess the opponent's ball, protect the ball and head hitting the ball; Strengthening specific techniques in volleyball game; Elementary collective tactical combinations in the game of volleyball; Two teams match 5 x 5 and / or 3 x 3

2nd Year – 2nd Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Fundamental Electronic Circuits	ETTI410	5	2	2	1	-

Course description (Syllabus): Systemic introduction in electronic circuits (Graphs for electronic circuits analysis, Two-port matrices, Nullator-norator-nullor model and synthesis of basic amplifiers); Feed-back amplifiers (Block schematic. Sampling and comparison circuits), General formula of negative feed-back, Calculation of $A_{u, i, y, z}$ in circuits with transistors and/or op-amp-s; Oscillators (Oscillators with non-linear devices or with negative resistance; a-stable "multi-vibrator" with transistors, Harmonic oscillators; positive feed-back; Barkhausen condition; frequency-dependant two-ports; "three-points" HF oscillators); Rectifiers with semiconductor diodes– mono- and multi-phase, in bridges ; voltage multipliers; Voltage and current stabilizers– architecture ; voltage references ; error amplifiers and output adjustment ; protection circuits.
Laboratory: *manual and semi-automated measurement, local and on the remotely –accessible „Virtual Electro-Lab" platform* http://vlab.unitbv.ro/velab Experimental and computer-aided study of : circuit models for main electronic device; feed-back amplifiers with transistors – basic topologies; diode rectifiers with low-pass filters; voltage stabilizers with integrated-circuits including error amplifiers, voltage references and over-current protection.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Signals and Systems II	ETTI411	6	3	2	1	-

Course description (Syllabus): Ideal models for analogic components, uni-ports and two-ports; Graphs (Topologic analysis of circuits - linear oriented graphs; Flow graphs - Mason); Multi-port (" n – port ") circuits (Matrix analysis of two-ports; Models of propagation and reflection in telecom two-ports; imagine parameters and work parameters, composed attenuation; Bartlett theorem; division theorem; Synthesis of analog linear circuits; realizability; positive-real functions of energy; passive immitance (Synthesis of passive uni- / two- ports: LC, RC (RL), RLC – Foster and Cauer methods; Synthesis of active circuits; the nullator-norator-nullor model; synthesis of amplifiers, negative impedance converters, gyrators; Switched capacitors); Approximation methods and synthesis of Butterworth, Cebyschev, Bessel and elliptic filters ; Analysis and synthesis of numeric linear circuits: numeric filters; dividers with combinational feedback ; coders and sequence generators

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Analog Integrated Circuits	ETTI412	6	3	2	2	-

Course description (Syllabus): Ideal operational amplifier (op amp); Real op amp analyzed in DC and very low frequency; The internal structure of the op amp; Static limitations of the op amp: Dynamic limitations of the op amp: Stability of negative feedback circuits: Circuits with resistive feedback network: Active filters: Single-supply op amp: Nonlinear circuits.

Seminar and laboratory: Ideal op amp; Real op amp analyzed in DC and very low frequency; Static and dynamic limitations of the op amp; Stability of negative feedback circuits; Circuits with resistive feedback network; Active filters; Single-supply op amp

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Digital Integrated Circuits	ETTI413	7	3	2	2	-

Course description (Syllabus): Boolean Algebra; Combinatorial Logic Circuits; Sequencial Logic Cicuits: Logic Design

Seminar and laboratory: Exercises and practical work based on course curricula.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
English Language 4	LE04	2	1	1	-	-

Course description (Syllabus): Data Security 1. Cause and effect. Causative verbs. Reading: scanning; Data Security 2. Reading a table. Cause and effect using *allow* and *prevent* links; Interview: The ex-hacker. Phrasal verbs. Word study: semantic groups.

Seminar: Information transfer from telephone call to form. Reporting a problem; Explaining a computer crime. Exchanging information; Describing how a system operates. Exchanging explanations; Role play based on prompts. Writing a short news item . Making a flow chart.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Physical Training 4	EF04	1	-	1		

Course description (Syllabus): Techniques for running and jumping exercises; Techniques for speed running speed; Technique of resistance running in varied terrain; Techniques of jumps; Organizing and participating in athletic competitions

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical Placement	ETTI412	4	90 hours			

Course description (Syllabus): Aspects of safety and health in practice activities; Soldering technology; Technology of printed circuit board; Small signal bipolar transistor amplifier; Adjustable power source; Dual power source; Virtual implementation using open-source software FRITZING; Resistors colour-coding

3rd Year - 1st Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electromagnetic Compatibility	EA501	4	2	0	1	0

Course description (Syllabus): EMC (ElectroMagnetic Compatibility) importance. History; European standards EN. Romanian standards. Sources of interference. Electromagnetic field effects on the human body; Coupling mechanisms: Capacitive, inductive and galvanic. Grounding and shielding. Lightning Electromagnetic Pulse and Nuclear Electromagnetic Pulse; EMC in analog and digital circuits; EMC in energy public distribution network; EMC measurements.

Laboratory: Overvoltage simulation in MATCAD; Voltage drops and frequency variation simulation in Matcad; Data transmission simulation in SPICE; Transient overvoltage suppression simulation in SPICE; Overvoltage suppression simulation in SIMULINK; Electromagnetic field measurements with spectrum analyser; Susceptibity measurements in TEM cell (Transversal ElectroMagnetic)

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Microprocessors Architecture	EA502	6	3	2	1	0

Course description (Syllabus): Microprocessor-based system organization; Instruction Set Architecture, ISA; Datapath; Controlpath; Current techniques and organizations for high performance microprocessors
Seminar: The topics of the lectures are taken again in the form of practical examples. Also, are exposed details and completions for topics of the lectures.
Laboratory: Working in assembly language.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Communication Fundamentals	EA503	4	2	-	1	0

Course description (Syllabus): Introduction in communications; Analog communications and linear modulation; Angle-modulated (exponential) analog communications; Digital communications; Polar diagram and the constellation diagram; Communications with pulse modulation; The effect of noise and the bandwidth of the communication channel.
Laboratory: Heterodyne radio transmitter; Communication with digital modulation (FSK, FSK, BPSK, QPSK, QAM); Communications with pulse modulation (PAM, PWM/PPM, PCM)

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Digital Signal Processing	EA504	4	2	0	2	0

Course description (Syllabus): Signals and signal processing; Time representation of discrete signals; Linear time invariant systems; Frequency representation of discrete signals and systems; Digital signal processing of continuous signals; Digital filters; Digital signal processing algorithms implementation.
Laboratory: Introduction to DSP package in Matlab; Frequency analysis of signals and systems (Z, DFT, FFT transforms, convolution); FIR and IIR filters: characteristics, design, windows;DSP programming: application development.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Design of Electronic Circuits	EA505	2	0	0	0	2

Project (Syllabus) – main issues: Analog and digital signals and transfer functions; Spectral analysis of input and output signals; Analysis and synthesis of active RC filter; Analysis and Synthesis of digital filters; Applications of PLL circuit; Multichannel filters. Switched capacitors filters; Design of an analog audio frequency signal processing system based on operational amplifiers: SPICE simulation and PCB designing using OrCAD Layout.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Data structures and algorithms	EA506	4	2	0	2	0

Course description (Syllabus): Data structures I (lists, stacks, graphs, queues, trees); Data Structures II (heaps); Algorithms efficiency analysis (iterative and recursive algorithms analysis); Geedy algorithms I (greedy technique, minimizing the average waiting time, optimal string sorting, Huffman codes); Greedy algorithms II (minimum spanning tree, shortest paths leaving from the same point, greedy heuristics); Divide et impera I (divide et impera technique, binary search, mergesort, quicksort); Divide et impera II (selection of an table item, cryptology problems, multiplying matrices, multiplying large integers) ; Dynamic Programming (fundamentals, determining the shortest paths in a

graph, optimal binary trees for searching, dynamic programming technique compared with greedy); Backtracking, mathematical games

Laboratory: The topics of the lectures are taken again in the form of practical examples. Also, are exposed details and completions for topics of the lectures. The examples are in the Java programming language.

The content is actually Data Structures and Algorithms. This course will change its name in the next academic year. The change aimed to introduce the course Java Programming in year 2.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Optical Communications	EA506	3	2	0	1	0

Course description (Syllabus): Introduction. Review of important concepts in Optics; Light detectors. Photoresistor. Photodiode. Phototranzistor; Led. Laser; Optical fiber; Optoelectronics systems. Applications; Photovoltaic cells.

Laboratory: The study of optical lens: hands-on and simulations; Light detectors. The characteristics; **Led. The I-V characteristic for different type of LED; Optical fiber. The Fotex and NI ELVIS platforms.**

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Renewable Energy Generation	EA507	3	2	0	1	0

Course description (Syllabus): Introduction. Solar radiation; Photovoltaic systems; Solar thermal energy; Wind energy; Hydropower energy; Energy storage.

Laboratory: Solar radiation measurements; Models for solar radiation; Dimensioning and testing a stand alone photovoltaic system; The study of photovoltaic panels in function of the temperature and the light levels; Weather station; Aeolian turbine; Solar collector; Sizing storage systems. Evaluation of storage and consumption.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Automatic Systems and Actuators	EA508	3	2	0	1	0

Course description (Syllabus): Structure of automatic systems; analog and digital outputs systems; Characterisation of the system (time domain, frequency domain, operational domain, input-output model, input-state-output model); Systems stability (Hurwitz, Nyquist, Jury, Liapunov and Popov stability criteria); Processes control (structures of processes control: P, I, PI, PID); Actuators (electrical, pneumatic and hydraulic).

Laboratory: DC motors; Stepping motors; On-off actuators; Air flow regulation system; Temperature regulation system; Illumination regulation system.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Sensor Systems	EA510	3	2	0	1	0

Course description (Syllabus): Concepts, terminology, classification, structure transducers, static and dynamic features, energy characteristics, design features, reliability features; Sensors for electrical quantities (current); Sensors for geometrical quantities (proximity, displacement/ position linear and angular, lebel; Sensors for cinematic quantities (linear speed, rotational speed, acceleration, vibration and shock); Sensors for mechanical quantities (force, weight, torque); Sensors for phisical quantities (pressure, flow, temperature);Sensors for chemical quantities (gas composition, humidity).

Laboratory: Linear displacement transducers - Linear Variable Differential Transformer – LVDT; Pressure transducers - strain gauges; Position sensors - optical rotary position sensor; Level sensor - Float resistive, capacitive, resistive a.c. bridge; Differential pressure transducer; Proximity Sensors - Reed sensor; Temperature sensors (thermocouples, thermal-resistance, thermistor).

3rd Year – 2nd Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Electronic Instrumentation	EA611	5	3	0	2	0

Course description (Syllabus): Signal Conditioning (protection, attenuation, amplifying, galvanic isolation, filtration, conversion, special operations: auto range, auto off-set, auto calibration); ADC and DAC circuits; Voltmeters (for small dc signals, for dc signals by chopping, for ac signals, true rms, for ac signal with dc gain); Universal counters (for frequency, periode and duration determination); Impedance-meter and Q-meter; Digital oscilloscope (construction, operating); Aquisition circuits (PC-cards, Modules, networks – RS232, 422, 485, GPIB, VXI).; Industrial networks (MAP, TOP, BitBus, ProfiBus, WorldFIP, P-NET, InterBus-S, SDS, MMS, LONWorks, HART, M-Bus).

Laboratory: LabView introduction; Simulation of the resistor, capacitor and inductor operation; Simulation of some ADCs; Simulation of some DACs; Saving and restoring the signals. Signal fitting; Virtual instrumentations: functions generator, periodic signal measurements, spectral analyzer; Aquisitions and commands with NI modules.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Testing of Electronic Equipment	EA612	3	2	0	2	0

Course description (Syllabus): Basics of Testing; Software technologies in testing (advanced LabVIEW Programming, VEE-Pro and instrumentation etc.); NI ELVIS in testing (measurement devices, analyzers, programming); Actual technologies and systems in TEE; Introduction to Test Stand; Real measurement systems and Virtual Instrumentation in testing; Simulation; Types of tests: reliability tests, diagnostic, etc. Main characteristic of testing systems; Using oscilloscopes and special devices in TEE; New USB controlled systems (oscilloscopes, generators, analyzers etc.); General structure of one tester; Hardware and Software for testers; Sensing and monitoring; Different types of busses (GPIB, LXI, USB, SERIAL etc.); Local and Remote control. Special devices in TEE (DC Power ANALYZER, Precision Source Measure Unit, Switches etc.); Optical measurement and sensors; Advanced Digital Data Acquisition Systems; Block diagram and components of one sequential tester; PXI technology and modules; Integration of PCI Express technologies; New tendency in testing; Syntetic Instruments; Software defined testing systems.

Laboratory: Introduction in Virtual Instrumentation (LabVIEW, VEE-Pro etc.); Data acquisition and computer controlled complex system; Practical testers and industrial systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Hardware Description Languages	EA613	4	1	0	2	1

Laboratory (Syllabus) – main issues: Verilog and VHDL; Behavioural modelling; Structural modelling; From idea to the implementation in digital design.

Project: Modelling and simulation of logic circuits with Verilog and ModelSim

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer Architecture	EA614	5	2	0	2	1

Course description (Syllabus): Introductory aspects; Main elements of computers: CPU, memory, computers buses, protocols, and interfaces; Cache memory, main memory, synchronization of CPU with events: principles, interrupt service routines, prioritization of interrupts, Direct Memory Access (DMA); Bridges and buses in computers; Auxiliary memory: hard disks, organization of data on HDD, interfaces of HDD, performances; Parallel processing and network computers; Introduction in Green IT

Laboratory: Works on a microprocessor platform: CPU register, Interrupt service, DMA access, Interfaces.

Project: Central processing unit design

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Image Processing	EA615	3	2	0	1	0

Course description (Syllabus): Introduction to image processing (pinhole camera model, mathematical model of images); Geometrical transforms (translation, rotation); Image enhancement (contrast enhancement, maximum contrast stretch, binarization, histogram equalization); Image filtering (linear and non-linear image filtering, smoothing, rank filters); Image transforms (2D Fourier, cosine, sine, Haar and Hadamard transforms, elements of wavelet transform); Image restoration (inverse filter, inverse filter with constraints, Wiener filter); Image compression (lossy and losseless compression methods, LZW, RLE, quad tree-based compression, transform-based compression); Image segmentation (formalism, edge detection, region-growing methods, Sobel and Prewitt filters); Mathematical morphology for binary and grey-scale images (dilation, erosion, closing, opening, properties); Image reconstruction from projections (Radon transform, back-projection operator); Shape analysis (statistical moments, Hu invariants, contour-based characterization); Texture analysis (cooccurrence matrix, Haralik parameters, fractal geometry)
Laboratory: Introduction to Intel OpenCV library; Introduction to image processing; Image enhancement (contrast enhancement); Histogram equalization; Geometric transformatations; Image filtering; Image transforms; Image compression; Image segmentation; Image processing using fuzzy logic

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Databases	EA616	3	2	0	1	0

Course description (Syllabus): Basic Concepts. The concept of database, utility and advantages, data independence, the fundamental objectives of DB. Database Management Systems (DBMS); Database environment. DB architecture with three levels. DB languages. Data models and conceptual modeling. Functions and components of a DBMS. Multiuser architectures. The system catalog; Relational data model. Terminology. Relational integrity. Relational languages. Relational DBMS; SQL language; Normalization of relations. The purpose of normalization. Functional dependencies. Normalization process - decomposition of relation schemes. The first normal form (1NF). The second normal form (2NF); The third normal form (3NF). Boyce-Codd Normal Form (BCNF). Fourth normal form (4NF); Concurrent operations in DB.
Laboratory: Overview of DBMS; Designing and creating a database; Creating tables and establishing the types of data fields; Primary keys, foreign keys, relationships between DB tables ; Forms and Subforms; D**esign of SELECT queries;** Design of ACTION queries.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Computer Operating Systems	EA617	3	2	0	1	0

Course description (Syllabus): Introduction: what is an operating system, history of operating systems, basic concepts of operating systems, processes, files, system calls, shell, operating system structure, monolithic systems, layered systems; Processes: process implementation, inter-process communication, race conditions, critical sections, mutual exclusion, semaphores, event counters, monitors, classic IPC problems, process scheduling, scheduling policy and mechanism, threads; Memory management: memory management without swapping and paging, with swapping, memory management with bitmaps, buddy systems, space allocation for swapping, virtual memory, paging, page tables, paging algorithms, paging policies, segmentation, combining segmentation and paging; File system: files, file names, file structure, file types, file attributes, file operations, implementation of file systems, files and directories, shared files, file system reliability, performance and security; I/O devices: device controllers, DMA access, I/O software, device drivers, hard-disks, disk scheduling algorithms; Operating systems security considerations: viruses, worms, generic attacks, mechanisms and methods for protection
Laboratory: Using Linux command line; Program development in Linux; Debugging; File operations; Using processes and threads; Inter-process communication.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Advanced Computer Graphics	EA0618	3	2	0	1	0

Course description (Syllabus): – main issues: Introduction to visual programming; Visual programming languages (VPL) – history, classification; Theory of VPL – formal specifications, analysis, scalability, representation; Specific VPL issues: control flow, procedural abstraction, data abstraction, etc.; VPL examples.
Laboratory: LabVIEW – introduction, basic features, functionality, examples.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Distributed Systems and WEB Architectures	EA0619	3	2	0	1	0

Course description (Syllabus): – main issues: Introduction to parallel computing; Parallel architectures; Multiprocessor systems, multicore processors, FPGAs; Parallel programming application areas: problems amenable to parallel solutions, parallel algorithms / parallelizing serial programs; Programming languages for parallel programming: portability issues, OS issues; Visual Programming Languages – introduction, classification, theory, examples; Benefits of visual programming in parallel computing
Laboratory: Parallel/multicore programming with LabVIEW: data parallelism, multithreading; Parallel/multicore programming with LabVIEW: examples, applications

Course title	Code	No. of credits	Number of hours per week
Practical Placement	EA620	4	3 weeks x 30 hours

Placement: in national and multinational companies
Siemens www.siemens.ro/practica-la-siemens, Miele, Foto Nation http://www.fotonation.com/contact/, Benchmark, Preh http://www.preh.com/, Other offers:
https://practica.unitbv.ro/
Course description (Syllabus): Electronic components and devices; Subassemblies and assemblies Technology; Electronic measurements; Elements of computer based office communication; Computers Networks; Software used in communications; Contributions to the company projects; Managing a company; Telecommunications activities: cable networks (electrical, optical); Internet services; Electronics technology in production companies

4th Year – 1st Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Artificial Inteligence	EA701	3	2	0	1	0

Course description (Syllabus): Preliminaries in neural computing; Fundamental concepts; The perceptron; Feedforward neural networks; Feedback neural networks; Associative memories; Self-organizing neural networks; Radial basis function neural networks; Fuzzy neural networks; Genetic algorithms.
Laboratory: The implementation of the learning rules; The training algorithm of a perceptron; The „Backpropagation of error" training algorithm; The „Winner takes all" training algorithm; Training the fuzzy neural networks; The implementation of a genetic algorithm; Homeworks.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Network and Internet Architectures	EA702	4	2	0	2	0

Course description (Syllabus): Internet components, network core; Computer network classification. Standards (ISO-OSI, TCP/IP, Internet models): Data link layer; Medium acces sublayer. Aloha, CSMA/CD, Ethernet; CSMA/CA protocol, 802.11 WLANs; Data link layer switching: Network layer: IPv4. IP subnetting, IP supernetting; Routing in the Internet; Transport layer; Application layer

Laboratory: Wireshark lab – Introductio; Wireshark lab – Ethernet; Wireshark lab – IEEE 802.11; Configuring programmable Ethernet switches; Wireshark lab – IPv4; Wireshark lab – ARP; Wireshark lab – DHCP; 8 Router configuration; Wireshark lab – HTTP; Wireshark lab - DNS

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Embedded Systems	EA703	5	3	0	2	0

Course description (Syllabus): Embedded Systems (EmS): Course objectives, competences, main characteristics of EmS; Introduction to EmS design methodology; Specific computer architectures for EmS, microcontrollers, IO interfaces, power management; DSP techniques in EmS: architecture, data buffers, digital decimation and interpolation; Interfacing EmS with real world: data acquisition, isolation, filtering, oversampling; Introduction in distributed EmS: architectures, real-time, case studies
Laboratory: Software development in C, for different applications with 8 bits microcontrollers

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
VLSI Design Techniques	EA704	5	2	-	1	1

Course description (Syllabus): MOS Transistors; CMOS Logic; CMOS Fabrication and layout; Logic Design; Circuit Design; Memories; Design Methodology.
Laboratory: combinational circuits; arithmetic circuits; D flip-flops; sequential circuits.
Project: Adder design

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Television	EA705	5	3	0	2	0

Course description (Syllabus): Principles of analog and digital radio; communications; Analog and digital broadcast receivers; Signal processing circuitry in receivers; The principle of image information transmission. Transition to digital broadcasting (DVB-T and DAB-T); Capture, processing and playback in television.Structure of complex television signal; Colour television systems; Operating principles of color television systems: PAL, SECAM; Digital television; high-definition television; cable television, 3DTV - current principles; Predictive encoding and decoding systems. Digitization of analog signals and data serialization (data streaming), MPEG and ITU-R BT 601 standards; Digital transmission signals in terrestrial television; Processing and transmitting mono and stereophonic sound in broadcasting. NICAM-728 system.
Laboratory: Measurement and control devices used in radio and television; Frequency spectrum of the local radio broadcasts and television; TV test image; Determining the frequency response; Determining the signal / noise; The general study of the television receiver; Channel selector; Color decoder. Color channels and color signals

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Microcontroller Applications	EA706	4	2	0	2	0

Course description (Syllabus): Timers: creating delays, periodic events; Digital input: reading buttons, button matrices, rotary encoders; Analog input: using ADC; Motor control: stepper motor control, BLDC motor control, fine movement using PWM; Displays: 7 segment, character LCD, graphical LCD; Communication interfaces: using UART, communicating with AT commands (Bluetooth, GPRS); Connecting SPI and I²C devices: serial EEPROM, real-time clock, digital sensors.
Laboratory: Various applications based on microcontroller development systems.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Software for Applied Electronics	EA707	4	2	0	2	0

Course description (Syllabus): Basic approaches for implementing software for embedded systems: memory access, peripheral access, polling, interrupt routines, software stacks, real-time operating systems; Using specialized functionality of microcontrollers/DSPs: adapting language constructs to available instruction set, language extensions, inline assembly; Redusing power usage: implication on software algorithms on power usage, finding bottlenecks, using different power-saving modes, writing code for reduced power consumption; Interpreting compiler output: map files, listings, analyzing occupied space; Optimization techniques: optimizing for speed vs. optimizing for size, branching costs, function inlining, loop unrolling; Software testing: simulators, emulators, in-circuit testing, automated test systems, continuous integration; Updateable systems: in-system reprogramming, remote updating, consequences on program execution, data storage, system versioning
Laboratory: Various applications based on microcontroller development systems ;

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Multimedia Technologies	EA708	4	2	0	2	0

Course description (Syllabus): Introduction to the multimedia technologies: Hystorical view, the concepts of static and dynamic media, data flows. Multimedia components: text, images, sound, video. Interaction; Multimedia data compression: introduction. Algorithms for lossless and lossy data compressione. Text compression. Examples; Image Compression and Processing: Introduction: the human eye, digitizing images. Color models. B/W and grayscale image compression (RLE, BTS, Huffman). Color image compression (TIFF, JPEG, JPEG2000). Image processing; Sound Compression and Processing: Introduction: the human ear. Digitizing sound. Sampling and quantization. Audio file formats. Losless sound compression. Psychoacoustics. Lossy sound compression. Multichannel sound; Voideo compression and Processing: Methods and standards for video compression. H263, H264, MPEG1-7; Multimedia Devices: Hystorical perspective and evolution. Image sensors, audio devices, SD and HD television. Optical memories: CD, DVD, Blu-Ray. Magnetic memories. Random access memories; Media Servers: Introduction, specific differences to the classical servers. Disc and process scheduling for multimedia.
Laboratory: Getting familiar with sound processing software. WAV Files. Sound compression. Processing sound; Getting familiar with image processing software. File formats. Vector and raster graphics. Image compression; Getting familiar with video processing software. File formats. Video compression; Getting familiar with multimedia authoring software.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Programmable Logic Controllers	EA709	4	2	0	2	0

Course description (Syllabus): Industrial informatics systems; PLC types: microprogrammed and vector automata; Programming languages:**:** IL (Instruction List), ST (Strucrured Text), LAD (Ladder Diagram), FBD (Function Block Diagram), SFC (Sequential Function Chart); Design of software for PLCs.
Laboratory: Automation of a sheet metal bending plant. Implementation of sequential scheme in LAD language, Implementation of the synthesized scheme based on the GRAFCET a) with hydraulic cylinders and monostable distributors and b) with hydraulic cylinders and bistable distributors in LAD language; Automation of a traffic light on a road under repair, implementation in LAD language; Automation of traffic lights at an intersection with a main and a secondary road, a) implementation in LAD language, simulation of operation in the LOGO environment and b) multiplying the number of outputs from the automaton, implementation in LAD or FBD language and realization of physical diagram on AP LOGO; Implementation with AP of a system of start/stop and change of direction of a d.c. motor, implementation in LAD or FBD language; Automation of a lock, implementation in LAD or FBD language.

4th Year – 2nd Semester

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Construction and Technology of Electronic Equipment	EA810	4	2	0	2	0

Course description (Syllabus): PCB design using OrCAD Layout; PCB fabrication; Industry standards; **Design for manufacturing (**assembly **and soldering processes; PCB design for signal integrity; Making and editing Capture parts; Making and editing footprints in Layout;** Postprocessing and board fabrication.
Laboratory: Drawing circuits in OrCAD Capture; Creating THD symbols and footprints; Creating SMD symbols and footprints; Preparing electrical circuit and PCB parameter setting; PCB Design with Layout. Automatic routing; PCB Design with Layout. Manual routing; PCB design with THD or SMD only; PCB design with THD and SMD.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Power Electronics	EA811	4	2	0	1	0

Course description (Syllabus): Power electronis devices (power diodes, fast diodes, Schottky diodes, power BJT, power MOSFET, thyristor, diac, triac, IGBT); Control and protection of power circuits; AC to DC converters (single and three phase); AC to AC converters (phase command, chopped command, PWM command); DC to DC converters (Buck, Boost, Buck-Boost, Cuk, SEPIC, Flyback); DC to AC converters (with thyristor - switching damped own switching, switching auxiliary, switching complementary, external switching circuit) single phase and three phase . Full-wave inverters, PWM (Half and Full Bridge).
Laboratory: UJT analyse; unipolar pulse generator; Diac analyse; bipolar pulse generator; Thyristor analyse; power regulator with thyristor; Triac analyse; power regulator with triac; Buck converter with IC MC34063A; Analyse of static switch with triac and optocupler.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Communications Systems	EA812	2	2	0	1	0

Course description (Syllabus): Digital techniques for telecommunications networks; Plesiochronous digital networks; Synchronous digital hierarchy; Introduction to GSM; GPRS; 2G to 3G evolution; CDMA principles; Introduction to UMTS.
Laboratory: Study of the switching and PCM transmission system PCM30/32EV; Modem programming with asynchronous terminal and the constellation diagrams; Control of the telephone calls; Manual and automatic connection on switched network; Noise effect, error correction and data compression.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Interfaces and Peripherals	EA814	5	3	0	1	1

Course description (Syllabus): History and classification. Structure; Serial and parallel data transfer. Transfer modes: programmed (polling), interrupt, DMA. Parity bit; Serial and parallel interfaces. Standards, examples; Connecting an Peripheral Equipment to a computer / microcontroller; Wireless interfaces: GPRS, Bluetooth, RFID, WiFi, proprietary protocols; Specific actuators and transducers; USB Universal Serial Bus. Bus architecture, interface examples. FTDI conversion circuits; Microcontroller interfaces; Video controllers.
Laboratory: Introduction. Assembly Language Programming; Parallel interface programming; Connecting 8 LEDs and 4 switches to the PC parallel interface.
Project: Designing an interface between a microcontroller and a wireless module; **Designing a motion system with stepper or DC motors.**

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
General Economy	EA813	2	2	1	0	0

Course description (Syllabus): Business - basic concepts. Business analysis and models; Business characteristics. Planning, organization, marketing; Decision and leadership in business. Business strategy; Entrepreneurship - concepts, features, tools; Entrepreneurial innovation - sources, success, failure, utility; Entrepreneurial strategies. Entrepreneurial company.

Seminar: Business analysis. Porter model; Analysis of the company products and services.. The BCG model; Business strategies in conditions of certainty, risk and uncertainty; Entrepreneurial innovation. Sources of innovation opportunities; Entrepreneurial strategies.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Virtual Instrumentation	EA815	2	2	0	1	0

Course description (Syllabus): Define virtual instrumentation and graphical system design concepts. Learn the basics of graphical programming language and using it for RT platforms with FPGA programming. Building instrument drives based on VISA architecture. Modeling and simulating using Multisim and LabVIEW. Show the available techniques for Image processing using virtual instrumentation. Metaheuristic and machine learning algorithms used with virtual instrumentation.

Laboratory: Developing Hardware In the loop solutions, drivers for measuring instruments and performing simulations based on PSPICE and graphical programming environments.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
LabVIEW Programming	EA816	2	2	0	1	0

Course description (Syllabus): LabVIEW programming language, dataflow paradigm, programming structures and data types, saving and reading data from files, programming architectures: state machines, producer-consumer, master-slave, complex architecture, data acquisition and processing.

Laboratory: Data flow and modular programming in LabVIEW, developing applications based on state machine architecture, and developing signal processing implementation in LabVIEW.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Elaboration of the Diploma Project	EA817	6	0	0	0	3

Project: Simulink. Overview; Commonly used blocks; Power Systems; Image Processing Blockset; Communication Blockset; Designing a process related to diploma project in Simulink. Analysis of the state of the art.

Course title	Code	No. of credits	Number of hours per week			
			course	seminar	laboratory	project
Practical Activity for Diploma Work	EA818	4	90 hours			

Practical Activity description: Documentation; Elaboration of projects, operation of electronic systems; Drafting specific software; Design of embedded application; Practical realization of embedded processor / microcontroller systems; Configuration, testing and operation of complex electronic systems; Teamwork; Oral and written communication; Technical and organizational problem solving.