UNIVERSITY "POLITEHNICA" OF BUCHAREST

FACULTY OF ENGINEERING IN FOREIGN LANGUAGES (FILS)

APPLIED ELECTRONICS in ENGLISH LANGUAGE, 2021-2022

CONTENT OF THE LECTURES FROM THE STUDY PLAN

14 Weeks/semester

Legend: "Ver" = evaluation form (E=exam in exam session, C or V = semester evaluation) "C" = Lectures (hours/week); "S" = Tutorial; "L" = Labwork; "P"=Project

From the optional subjects, only one of the two will be taught, depending on students' choice. The facultative subjects will be taught only if a sufficient number of students choose them, to form the group.

I Year, 1st Semester

Subject	Code	ECTS points	Hours/week				Ver
			C	S	L	P	
MANDATORY Subjects							
Analiza matematica 1/ Calculus 1	12 F 01 O 001	5	3	2			E
Algebra lineara/ Linear Algebra	12 F 01 O 002	4	2	2			E
Bazele electrotehnicii 1/ Fundamentals of Electrical Engineering 1	12 D 01 O 052	3	2	1			E
Chimie/ Chemistry	12 F 01 O 052	3	2	1			E
Sisteme de operare/ Operating System 1	12 D 01 O 003	4	2		2		V
Limbaje de programare/ Programming Languages	12 F 01 O 053	4	2		2		E
Grafica asistata de calculator/ Computer Aided Graphics	12 F 01 O 004	3	1		1		V
Comunicare profesionala 1/ Professional communication 1	12 C 01 O 005	2		2			V
Educatie fizica si sport 1/ Physical Education 1	12 C 01 O 006	2			1		V
FACULTATIVE Subjects							
Cultura si civilizatie europeana 1/ European Culture and Civilization 1	12 C 01 L 010	2	1	1			V
Limba engleză pentru studii academice inginerești 1/ English for Engineering Academic Study 1	12 C 01 L 014	2	1	1			V
Limba și cultura română pentru studenți străini 1	12 C 01 L 901	2		2			V

CALCULUS 1

Calculus 1 continues the theory of functions of one single variable (from the college); in the first part it contains: real and complex numbers, sequences and series of numbers, sequences and series of functions. In the second part, the differential calculus of functions of several variables is presented: partial derivatives, the differential, extrema and conditional extrema, implicit functions.

LINEAR ALGEBRA

The discipline "Linear Algebra" sets as its main goal the development of abilities of handling the concepts of the Linear Algebra by presenting them in direct relation with other sciences;
Main objectives, techniques and concepts of the course: Explaining the theoretical and practical contents of Linear Algebra and Analytic Geometry [Details: Solving linear systems. Vector spaces and subspaces, basis and dimension. Scalar product, orthonorming. Linear mappings. Eigenvectors andeigenvalues, diagonal form. Isometric transformations: translations, rotations, symmetries; the decomposition theorem for Euclidean isometries. Quadratic forms - canonic expression, signature. Operations with free vectors, Cartesian coordinates, the straight line and the plane in space. Conics and quadrics]; using advanced applicative methods in solving linear systems, dealing with isometric mappings, algebraic curves and surfaces. Generating a positive euristic, scientifically grounded attitude towards Science. Attending Student Scientific Communication Colloquia.

FUNDAMENTALS OF ELECTRICAL ENGINEERING 1

Course content: 1. Topology of electrical circuits. Kirchhoff's laws. Powers. 2. Ideal and real elements of the DC electrical circuits. 3. Equivalences of the DC circuit elements. 4. Systematic methods for solving of the DC electrical circuits. 5. Theorems of the electrical circuits. 6. Electrical circuits in variable regime. 7. AC electrical circuits. 8. Equivalence of the AC circuit elements. 9. Resonance of the AC circuits. 10. Systematic methods for solving of the AC electrical circuits. 11. Electrical circuits in non-sinusoidal regime.
Subject general goal: Understanding of the fundamental concepts for the analysis of electrical circuits in DC regime, AC regime, non-sinusoidal regime and time variable (transient) regime.

CHEMISTRY

Nowadays an important accent is on the interdisciplinary character of the researchers. Chemistry is involved in all technical activities, not only at the level of materials, environmental protection, but also directly, through processes of chemical nature. The basic knowledge about chemical reactions and systems involved in chemistry is the key condition for understanding particular chemical aspects of different non-chemical

engineering fields. The modern devices are based on new materials and a future engineer needs to possess knowledge about chemical structure and physic-chemical properties in order to be able to design new intelligent materials. This discipline insists on the structure and the properties of the most important materials in the nanomaterials era, on the possibility of spontaneous evolution of processes and insists also, on the electrode processes study, to understand the phenomena that govern device performance.

OPERATING SYSTEM 1

The course has as main objective to provide an overview of the computer operating systems, to indroduce basic concepts and mechanisms of modern operating systems and virtualization. The emphasis is on principles and organization of operating systems, but also on practice, so as to illustrate key concepts in a practical context. At the end of the course, the students will understand some of the basic concepts concerning computers operating systems, to configure a basic computer operating system, to interconnect two or more computers, to apply basic security and protection to operating systems. Improve self-learning and team work capabilities (during project assignments).

PROGRAMMING LANGUAGES

This course is about computer programming. It emphasizes principles of sound design and good programming practice, aimed at developing programs of high quality and maintainability.

*The course objectives are: t*o introduce the Java language as a true object-oriented language. To develop skills in the software design and programming using Java and its standard class libraries. To develop understanding of problems and build skills in the use of abstraction in order to manage the problem complexity.

A student completing this course should: Have a clear understanding of the OO terminology generally and that used to describe features of Java. Be able to design and write Java programs to solve moderately complex problems that meet requirements expressed in natural language. Have a clear understanding of what comprises a correct program in Java. Be able to understand the Java API documentation. Have an informal understanding of the semantics of object-oriented programs in terms of responsibility and collaboration.

COMPUTER AIDED GRAPHICS

The Computer Aided Graphics, on which designing, project making and manufacturing are based, is one of the most important study disciplines in superior technical education. Computer Aided Graphics is a science and a language too; it’s a tool of knowledge, communication and social interaction. The components of this science are: Descriptive geometry, Technical drawing, and Computer graphics. Descriptive

Geometry establishes laws which are to enable the representation of spatial objects and of spatial situations. These laws (rules) are coming directly from the elementary geometry. Technical drawing relies on orthogonal (orthographic) projection, which supplies the best conditions for describing shape of an object, and it is best fitted to make dimensioning, which is the second function of a technical drawing.

PROFESSIONAL COMMUNICATION 1

The practical course (seminar) Professional Communication 1 is addressed to first year bachelor level of the FILS. Its general objective is the development of the communicative competence of the students in English which is used as a medium of instruction in FILS. Stress is placed on the four fundamental components: listening, writing, reading and oral communication, developed based on the adequate grammatical and lexical support corresponding to the required level, viz. B2/C1 - CEFR. The teaching of this subject has the following secondary objectives: the capacity to use in real context communication situations certain adequate simple/phraseological units incorporating cultural and civilization connotations, appropriately using the necessary lexical and grammatical structures, with a focus on those structures encountered in the professional contexts of the future engineers.

PHYSICAL EDUCATION 1

This course is designed to enhance physical and intellectual effort capacity, a harmonious development of the body and to optimize health. Prevent the appearance of global and segmental physical deficiencies and to form and maintain correct body attitudes. The main objectives of this course are: to improve basic motor skills (force, speed, strength, dexterity); Acquire and consolidate basic technical elements and procedures from athletics, gymnastics, sports games and applied sports and their application under competitive conditions or bilateral game; Learn basic concepts of regulations for sports games (volleyball, basketball, handball, gymnastics) to organize and conduct various competitions; Stimulate students' interest in systematic and independent practicing of physical exercise individually and collectively daily or weekly; Create the habit of complying with sports hygiene and accident prevention rules; Develop the self-defense and self-surpassing capabilities.

EUROPEAN CULTURE AND CIVILIZATION 1

The course is designed as an introduction to some major issues of European culture and philosophy, which may give an account of what does it mean to be European. The focus will be on the theoretical and historical roots of individualism, liberalism and rights versus collectivism, traditionalism and beliefs. This would increase students capacity for judging, assessing and understanding not only theoretical problems but also practical questions generated by their complex social engagements. Topics covered: I. Greek cosmos; II.

Medieval divine cosmos; III. Modern secular thought; IV. Contract, rights,individualism; V. Enlighment; VI. Social utopia, collectivism, and totalitarianism; VII.Post-comunism and post-modernism; VIII. EU and Globalization; IX. One Europe or several?

ENGLISH FOR ENGINEERING ACADEMIC STUDY 1

The discipline is addressed to all students of bachelor level year I of FILS – English stream. Its main objective is the development of academic study skills with English as the medium of instruction. Main aims are to develop the skills and level of proficiency in English for academic study of the engineering type, particularly reading and autonomous study skills development. Specific objectives: successful effective communication in the university and in the working environment, ensuring the skills for autonomous study in the technical domain at higher education level.

ROMANIAN LANGUAGE, CULTURE AND CIVILIZATION 1

The practical course (seminar) of Romanian Language, Culture and Civilization is addressed to the foreign students in the first year, enrolled at the Faculty pf Engineering in Foreign Languages and has the following general objective: the development of students' communication competence with a focus on the four fundamental skills: listening, writing, reading and speaking. Moreover, it is important to mention the following secondary teaching objectives: the capacity to use in real communication contexts simple and complex vocabulary structures with reference to cultural and civilization conotations, as well as the capacity to adequately use the grammar structures.

I Year, 2nd Semester

Nume disciplina	Cod	Puncte credit	Nr. Ore/sapt.				Ver
			C	S	L	P	
Discipline OBLIGATORII comune							
Analiza matematica 2/ Calculus 2	12 F 02 O 007	5	3	2			E
Fizica 1/ Physics 1	12 F 02 O 008	4	2	1	1		E
Bazele electrotehnicii 2/ Fundamentals of Electrical Engineering 2	12 D 02 O 053	5	2	2			E
Dispozitive electronice / Electronic devices	12 D 02 O 054	4	2	1	1		E
Structuri de date si algoritmi/ Data Structures and Algorithms	12 D 02 O 056	4	2		2		E
Introducere in programarea web/ Introduction to Web Programming	12 S 02 O 057	4	2		2		V
Comunicare profesionala 2/ Professional communication 2	12 C 02 O 101	2		2			V
Educatie fizica si sport 2/ Physical Education 2	12 C 02 O 009	2			1		V
Discipline FACULTATIVE							
Cultura si civilizatie europeana 2/ European Culture and Civilization 2	12 C 02 L 012	2	1	1			V
Limba engleză pentru studii academice inginerești 2/ English for Engineering Academic Study 2	12 C 02 L 015	2	1	1			V
Limba și cultura română pentru studenți străini 2	12 C 02 L 903	2		2			V

CALCULUS 2

The course Calculus 2 is a presentation of the theory of the integral of functions of several variables. The main topics are: the Riemann integral, improper Riemann integral, functions defined by integrals, double and triple integrals, line and surface integrals. The integral formulae (Green-Riemann, Gauss-Ostrogradski and Stokes) and an introduction to the field theory are presented too. The course contains also a brief introduction to the metric spaces theory and applications of the fixed point principle.

PHYSICS 1

Short description: The ultimate goal of Physics I Course is to provide the students with an opportunity to develop their knowledge of the physical world through study in wave optics. Students will learn the concepts, principles and technical vocabulary associated with optics areas of very wide-ranging application. The course will describe the nature and properties of light, its propagation, light – matter interactions, the main optical phenomena and their applications. The students will acquire theoretical and practical knowledge about some modern equipments and techniques using optical phenomena.

FUNDAMENTALS OF ELECTRICAL ENGINEERING 2

Students will develop a professional understanding of electromagnetics and its role as a pillar in EEC education. Students will be provided with a wide foundation that prepares them for diverse specialization paths, useful also for immediate employment after graduation. Students will develop the ability to apply electromagnetic field laws to obtain analytical field solutions for discrete and continuous charge and current distributions, for both time-varying and quasistatics fields, to calculate resistances, inductances and capacitances, electric and magnetic forces; o calculate magnetic circuits, to understand electromagnetic energy, power flow. Content: Solving methods for Time-periodic linear circuits and transient state of linear circuits. Introduction to electromagnetic field theory Primary and secondary quantities. Elements of vectorial calculus, Electrostatics. Coulomb's law, Electric field. Point, linear, surface and volume charge distribution. Constitutive law of electric field, Electric flux (Gauss') law: spherical and cylindrical charge distributions. Scalar Electric potential. Poisson's and Laplace's equations, Dielectrics. Capacitors (parallel plates, cylindrical, spherical). Capacitance. Series and parallel connections. Electrostatic energy. Forces in electric field, Law of charge conservation. Law of electric conduction. Ohm’s law. Law of electric power transfer through conduction. Law of electrolisys. ,Faraday's law of Induction, Stationary currents, Magnetostatics. Divergence, magnetic potential vector and curl of a magnetic field. Constitutive law of magnetic field. Law of magnetic flux. Biot-Savart-Laplace formula, Magnetic (Ampere's) circuit law: examples. Magnetic circuits. Magnetic energy. Forces in magnetic field, Maxwell’s equations in integral form in free space. Differential form of Maxwell’s equation, Poynting’s theorem. Power flow, electromagnetic energy, power in electric circuits.

ELECTRONIC DEVICES

The discipline familiarizes students with the basic principles of electronics. Understanding the role of electronic devices is facilitated. The main objectives are: creating the skills to apply general knowledge in understanding the basic principles of electronics. The following are considered in particular: familiarization with the main types of electronic devices; establishing practical skills

DATA STRUCTURES AND ALGORITHMS

Data structures have multiple cross-domains applications. Understanding their usage, their performance capabilities and their internal mechanisms can help one to make informed decisions regarding the most appropriate solution for a particular problem. This course addresses the design, development and implementation of the fundamental data structures and data structure-related algorithms in the C/C++ programming language. The topics covered by the course are related to C/C++ programming (such as struct

vs. classes, template classes, dynamic memory allocation) the Abstract Data Type concept and the following data structures: stack, queue, linked lists, graphs, hash tables, binary trees, binary search trees and heaps.

INTRODUCTION TO WEB PROGRAMMING

The course Introduction to Web Programming shows the students the basic elements of Web Application Development, one of the most inciting and asked for on the job market. The students learn the basics of the most important programming languages for the web (HTML, CSS, Javascript, PHP) and also learn how to apply them using correct principles for web development. We discuss also practical aspects needed in web development like accessibility, usability and client-server applications, session implementation. The course also improves the students' programming skills as they have to implement functions and small algorithms using different types of languages (Javascript and PHP).

The course has to be continued with a more advanced web development course that handles data management, development models and so on.

The course is adapted to the job market and it has the premises to prepare the students for a career in web development.

PROFESSIONAL COMMUNICATION 2

The practical course (seminar) Professional Communication 2 is addressed to first year bachelor level of the FILS. Its general objective is the development of the communicative competence of the students in English which is used as a medium of instruction in FILS. Stress is placed on the four fundamental components: listening, writing, reading and oral communication, developed based on the adequate grammatical and lexical support corresponding to the required level, viz. B2/C1 - CEFR. The teaching of this subject has the following secondary objectives: the capacity to use in real context communication situations certain adequate simple/phraseological units incorporating cultural and civilization connotations, adequately using the necessary lexical and grammatical structures, with a focus on those structures encountered in the professional contexts of the future engineers.

EUROPEAN CULTURE AND CIVILIZATION 2

The course is designed as an introduction to some major issues of European culture and philosophy, which may give an account of what does it mean to be European. The focus will be on the theoretical and historical roots of individualism, liberalism and rights versus collectivism, traditionalism and beliefs. This would increase students capacity for judging, assessing and understanding not only theoretical

problems but also practical questions generated by their complex social engagements. Topics covered: I. Greek cosmos; II. Medieval divine cosmos; III. Modern secular thought; IV. Contract, rights, individualism;

V. Enlighment; VI. Social utopia, collectivism, and totalitarianism; VII. Post-comunism and post-modernism; VIII. EU and Globalization; IX. One Europe or several?

ENGLISH FOR ENGINEERING ACADEMIC STUDY 2

The discipline is addressed to all students of bachelor level year I of FILS – English stream. Its main objective is the development of academic study skills with English as the medium of instruction. Main aims are to develop the skills and level of proficiency in English for academic study of the engineering type, particularly reading and autonomous study skills development. Specific objectives: successful effective communication in the university and in the working environment, ensuring the skills for autonomous study in the technical domain at higher education level.

ROMANIAN LANGUAGE, CULTURE AND CIVILIZATION 2

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II Year, 1st Semester

Nume disciplina	Cod	Puncte credit	Nr. ore/sapt				Ver
			C	S	L	P	
Discipline OBLIGATORII comune							
Matematici speciale/ Special Mathematics 1	12 F 03 O 051	4	2	2			E
Probabilitati si statistica/ Probabilities and Statistics	12 F 03 O 001	3	2	1			E
Fizica 2/ Physics II	12 F 03 O 002	4	2		1		E
Circuite fundamentale electronice / Fundamental Electronic circuits	12 D 03 O 058	4	2		1		E
Circuite integrate digitale/ Digital Integrated Circuits	12 D 03 O 055	4	2		2		V
Baze de date/ Databases	12 D 03 O 056	5	2		1	1	E
Programare orientata pe obiecte/ Object Oriented Programming	12 D 03 O 054	4	2		2		V
Microeconomie/ Microeconomics	12 C 03 O 003	2	1	1			V
Discipline FACULTATIVE							
Comunicare tehnică 1/ Technical Writing 1	12 C 03 L 101	2		2			V

SPECIAL MATHEMATICS 1

The main goal of the course is the acquisition by students of the operating capabilities of the fundamentals, methods and techniques provided by Applied Mathematics, as well as students' training for analysis, drawing up and utilization of the mathematical models in engineering.

Attending this course, students assimilate theoretical knowledge, basic formulas and algorithms for solving problems of Mathematical Physics, Fluid and Solid Mechanics, Electrical Engineering and Control Engineering. This course improves abilities in using specialized the software packages Matlab and Maple. Topics: Higher-Order Differential Equations. Systems of Differential Equations. Stability. Routh-Hurwitz criterion. Lyapunov functions. Complex Functions. Residues theory. Conformal mappings. Fourier series, Fourier Transform, Laplace Transform, Z Transform.

PROBABILITIES AND STATISTICS

The objectives of this course are: the formation of the capacities of handling the concepts of the probability and statistics by presenting them in direct relation with other sciences; the completion of the students knowledge with theoretical and applicative notions; the students will be able to understand applied models from reliability, physics, game theory and much more; they would be able to realize predictions based on preexisting data or to estimate parameters in optimization issues.

Topics: The notion of probability. Geometric probability. Conditional probability. Applications to reliability. Sequence of independent trials. Limit theorem. Random variables. Distribution functions. Random vectors. Numerical characteristics. Correlation. Regressions. Characteristic functions. Classical laws via characteristic functions. Data representation and analysis. Estimation of parameters. Confidence intervals. Approximation theory in statistics. Least squares methods.

PHYSICS II

Short description: With the growing interest in nanotechnology, quantum physics has recently become increasingly important for an ever-widening range of engineering disciplines. The Physics II course is intended to provide the student with a clear and logical presentation of the basic concepts and principles of quantum physics and to strengthen an understanding of the concepts and principles through practical applications. During the first part of the course students learn phenomena that have lead to the quantum ideas. Then, the formalism of quantum physics is presented in two steps. Probability plays a central role in making sense of quantum physics. Applications are emphasized whenever possible, including those related to the mathematical formalism, i.e., the quantum computer and quantum cryptography. Quantum mechanics formalism is used in the explanation of the periodic table of elements and the understanding of electrical properties of solids.

FUNDAMENTAL ELECTRONIC CIRCUITS

The study of Analog devices (diodes, bipolar and field-effect transistors) and basic circuits such as small signal amplifiers, differential amplifiers, analog mathematics, active filters. Specific targets: The behavior, performances, limits and typical applications of fundamental analog circuits; Diodes; Junction Field Effect Transistor JFET; Metal Oxide Semiconductor Field Effect Transistor MOSFET; Bipolar Transistors; small signal amplifiers; differential amplifiers; Operational Amplifiers and their fundamental applications.

DIGITAL INTEGRATED CIRCUITS

The subject introduces the students to the organization and functioning of computer systems based on digital principles. Digital representation of information is followed by presentation of binary and hexadecimal

representations. There are covered digital logic design issues, including combinational and sequential logic. For Sequential Logic there are presented applications using Finite State Machines.

DATABASES

Relational DataBase Management Technology is a dominant area of the digital world. Therefore understanding the basic concepts of structured data, the relational model, OnLine Transaction Processing and OnLine Analytical Processing are highly relevant for any professional working in the knowledge economy. The course aims beyond SQL standard and language by overviewing the new trends in data management such as Big Data, Data Lake, Machine Learning, NoSQL, Autonomous Database and Blockchain with the intention to offer the students a comprehensive perspective of the way data is managed in a digitally oriented organization. By contrast, the laboratory hours focus on the SQL language fundamentals using the educational content provided by Oracle Academy in partnership with FILS as a first step in achieving Oracle 12C database associate international certification.

OBJECT ORIENTED PROGRAMMING

This course resumes the introduction to object-oriented programming with new object-oriented concepts: inheritance, class reusing, polymorphism, object-oriented containers, object factories, and exception handling. It also covers some specific characteristics of the Java language (applets, graphics, event handling, threading), and applies object-orientation concepts to the design, coding, and testing of Java programs. Students in the course should expect to spend a fair amount of time on their own developing programs. Programming, like most other skills, is best learned by doing.

The course objectives are to present advanced programming concepts in Java language, to develop skills in the software design and programming using Java and its standard class libraries, to develop understanding of problems and build skills in the use of abstraction in order to manage the problem complexity.

MICROECONOMICS

The subject teaches microeconomics notions laws and principles for engineers. The goal of such a subject is to support with basic economic knowledge the foundation of a future engineer in approaching correctly decisions in companies. Microeconomics is about individuals' choices of where to live and work how much to save, what to buy, and firms' decisions about allocation, hiring, firing, and investment - involves issues that concern us on a daily basis. This course develops students’ abilities to construct and sustain an argument, develop the literacy and verbal communication, skills necessary for presenting reasons of economic nature. Upon completion, students should be able to identify and evaluate consumer and business alternatives in order to achieve economic objectives efficiently.

II Year, 2nd Semester

Nume disciplina	Cod	Puncte credit	Nr. ore/sapt				Ver
			C	S	L	P	
Discipline OBLIGATORII comune							
Arhitectura microprocesoarelor / Microprocessor Architecture	12 D 04 O	4	2		2		E
Semnale si sisteme / Signals and Systems	12 D 04 O 055	5	2	1	1		E
Bazele electrotehnicii 3/ Fundamentals of Electrical Engineering 3	12 D 04 O 057	4	2	1	1		E
Metode numerice/ Numerical Methods	12 F 04 O 004	5	2		2		V
Sisteme de operare 2 / Operating Systems 2	12 D 04 O 058	5	3	1	1		E
Măsurători electronice, senzori şi traductoare/ Electronic Measurements, sensors and transducers	12 S 04 O 059	5	3		2		E
Macroeconomie/ Macroeconomics	12 C 04 O 014	2	1	1			V
Discipline FACULTATIVE							
Comunicare tehnica 2 / Technical Writing 2	12 C 04 L 102	2		2			V

MICROPROCESSOR ARCHITECTURE

The course offers an introduction to the computer/microprocessor architectures and addresses in more details two different implementations: AVR-8 and x86 (limited to 8086/8088). Both hardware aspects and some software mechanisms are explored through a series of significant examples/problems.

The course starts with the historic perspective of digital computers evolution and addresses both theoretical and technological aspects. The course is also considering the laws that shaped the impact of technology evolution: Moore's Law, Dennard Scaling, Amdahl's Law.

Instruction Set Architecture (ISA) and General Purpose Computer Architecture are analyzed together with the mechanisms used to improve performance. The lab is intended to initiate the students with hardware development and low-level programming for AVR-8 microcontroller family. The problem sets and lab exercises are intended to give students "hands-on" experience in using microprocessors and develop specific applications.

SIGNALS AND SYSTEMS

The course defines the basic notions and concepts of signal and system theory. Continuous-time and discrete-time signals and systems are analyzed. The course gives the basic notions of the signal theory and also the systems and associated general concepts are presented. The main purpose of this course is to create abilities to apply the fundamental notions concerning the concepts of signal and system and also to apply signal processing methods to realize specific functions in electronics. Fourier analysis of the continuous-time periodic and non-periodic signals is given. Distribution theory elements connected with signals and systems are presented. The Hilbert transform for continuous-time signals is introduced. Convolution and correlation of the continuous-time signals and the representation of the continuous-time signals by the Laplace transform are presented. Sampling theorem is studied. Harmonic carrier modulations: amplitude modulation, frequency modulation, phase modulation are described and also frequency division multiplexing is exposed. Amplitude pulse modulation and time division multiplexing are treated. General concepts of the continuous –time system theory are presented and the transfer function for the continuous-time linear-time invariant system is introduced. Fourier analysis of the periodic and non-periodic discrete-time signals is given. Discrete time representation by z-transform is given, as well as discrete Fourier transform. Convolution and correlation of the discrete-time signals are presented. General concepts of the discrete-time systems are studied and the transfer function of the discrete-time linear-time invariant systems is defined.

FUNDAMENTALS OF ELECTRICAL ENGINEERING 3

The students get used to different CAD software for electric circuits modelling and for electromagnetic field modelling. The students will be able to solve electric circuits in different functioning regimes: (dc, ac, transient). The students will be able to model different applications specific for electromagnetic field devices working in different states. They will be able to apply the knowledge received during El. Eng. 1 and El. Eng. 2. They will be given a better understanding of electromagnetic phenomena and they will understand the importance of using CAD for electric circuit/electromagnetic field problems simulation.

NUMERICAL METHODS

This course provides an introduction to numerical methods and computer programming for the solution of various types of scientific problems. The primary objective of the course is to develop the basic understanding of the construction of numerical algorithms, their applicability and limits of their appropriate use. The course is interdisciplinary in nature, incorporating a number of case studies in information technology, electronic engineering, mechanics and chemistry.

OPERATING SYSTEMS 2

Understanding fundamental concepts in architecturing, designing, developing, fine-tuning, and using modern operating systems, as well as those of the top actual implementations (Unix/Linux versus Windows and Mac OS X, as well as iOS versus Android). Understand what is going on "behind the scene" from the moment of powering on a computer, to OS kernel and then software application start, runtime, and end, and up to finally shut down, in modern multi-tasking, multi-user, and multi-processor platforms. Understand major advantages and drawbacks of both OS fundamental theoretical solutions and their existing implementations. Be able to fine tune modern OS platforms. Solving homework and preparing and defending a semester project, by using the theory and practice learned during lectures and labs.

Transversal competence: Becoming familiar with team work roles and activities for analyzing requirements, designing, implementing, testing, documenting, and defending a project, by using an operating system facilities. Becoming aware of the need of continuous improvement; efficient use of resources and solving techniques developed during lectures and labs for elaboration of an operating system project and documenting all of its steps.

ELECTRONIC MEASUREMENTS, SENSORS AND TRANSDUCERS

Measurement is a fundamental skill for engineers, including software engineers. This course will provide students with basic knowledge on measurements techniques, analog and digital instruments architecture and use, methods and transducers to measure principal physical variables. All automatic systems demand measurements in one stage or another. For this reason, al electric engineers with software or electronics formation should be acquainted with measurements. Lectures are sustained by a workshop for the practical formation of students in the field of electrical measurements.

MACROECONOMICS

Macroeconomics studies the aggregate behavior of the economy. This course provides an introduction to the economic analysis of key macroeconomic variables such as output, employment, inflation, interest rates and exchange rates. The important elements of the course include measurement of macroeconomic variables, the development of models and theories to explain the behavior of macroeconomic variables, the use of empirical evidence in evaluating different models, and the role of government policy in seeking to influence macroeconomic outcomes. The course will provide students with a framework for understanding the workings of the whole economy and the various interactions among households, business and governments.

III Year, 1st Semester

Nume disciplina	Cod	Puncte credit	Nr. ore/sapt				Ver
			C	S	L	P	
Discipline OBLIGATORII II							
Transmisiuni de date/ Data Transmissions	12 S 05 O 053	4	2		1		E
Proiect Circuite integrate digitale / Digital integrated circuits project	12 D 05 O 054	2				2	V
Retele de calculatoare/Computer Networks	12 S 05 O 055	4	3		2		E
Circuite integrate analogice / Analog Integrated Circuits	12 D 05 O 101	3	2		1		E
Grafică computerizată avansată/ Advanced Computer Graphics	12 S 05 O 057	3	1		2		V
Monedă şi sistem bancar/ Money and Banking	12 C 05 O 001	2	1	1			V
Arhitectura calculatoarelor/ Computer Architecture	12 S 05 O 058	4	2		2		E
Disciplină OPTIONALĂ O1 EA							
Fiabilitate si controlul calitatii / Reliability and Quality Control	12 S 05 A 105	4	2		1		V
Dezvoltarea aplicaţiilor pentru dispozitive mobile/ Application Development for Mobile Devices	12 S 05 A 106						
Disciplină OPTIONALĂ O2 EA							
Proiectarea si complexitatea algoritmilor/ Algorithm Design and Complexity	12 S 05 A 105	4	2		1		V
Internetul Dispozitivelor Inteligente/ Internet of Things	12 S 05 A 106						

DATA TRANSMISSIONS

This course offers an introduction into the concepts, principles and terminology used in the design, operation, and maintenance of data transmissions systems. The subject covers the following: signals analysis and processing, transmission systems, baseband and passband data transmissions, and advanced data transmissions techniques for modern systems.

DIGITAL INTEGRATED CIRCUITS PROJECT

The subject introduces the students to the design, testing and creation of equipment using Digital Integrated Circuits. The circuits are tested on Java Breadboard (or similar) application and implemented on breadboard of perfboard. A report is made about the project.

COMPUTER NETWORKS

The aim of this course is to introduce the issues and basic principles of computer networks. The objectives are to develop a framework into which more detailed material regarding specific aspects of the computer networks will be studied such as computer topologies, layered network models, networks protocols, computer configurations, algorithms routing, security in networking, etc.

ANALOG INTEGRATED CIRCUITS

Analysis and design of analog integrated circuits is an area of great interest, because in this moment there is an important demand for engineers in the design of integrated circuits. Studied and designed structures present a multitude of practical applications in most areas of electronics, as well as in areas that indirectly uses electronics. The course curriculum specifically responds to current trends and technological evolution. The course and its related applications provide students knowledge and skills that enable quick employment after graduation in a reputed company in the field.

ADVANCED COMPUTERS GRAPHICS

Computer graphics is an important branch of computer science, including areas such as computer-aided design (CAD), scientific visualization, movies and games, virtual and augmented reality. As part of the "Advanced computer graphics - ACG" course, students are introduced to the field of computer graphics through theoretical and practical content including (but not limited to) 2D and 3D geometric transformations, rasterization, projections and clipping, detection of visible surfaces in a scene or notions of lighting. During the ACG laboratory, students combine in a practical manner the knowledge acquired in mathematics, trigonometry, geometry and programming to create 2D and 3D graphic scenes using the OpenGL language. From a simple graphics window, from the lowest level of the pixel, continuing with the generation of 2D polygons and reaching advanced notions of clipping, interpolation and approximation, generation of 3D objects, lighting and rendering effects., they will be able to create their own mini-game engine and learn the basics that can be essential for a future career in the gaming industry or in research based on virtual and augmented reality.

MONEY AND BANKING

The subject focuses on interest rates, the concept of money, exchange rates and monetary policy. Topics covered include banking structures and function, the European Central Bank, determinants of the money supply, fiscal policy and monetary policy, and international economies. The course will present an opportunity to discuss the financial institutions and monetary policies of different nations and evaluate their relative success in recovering from the financial crisis. Within this, the interaction between the financial system (in terms of its institutions and instruments) and the macro-economy will be examined and there will be a strong practical and policy related element to the course.

COMPUTER ARCHITECTURE

This course presents computer architecture. We will focus on digital logic design, microprocessor instruction set and assembly language, memory system, input-output and computing optimization. The student gets the grasp of the computer hardware, its design and interface to software, as well as methods for performance enhancement. At the end of the lecture, the students should be able to: Show understanding of digital logic principles, Use combinational and sequential logic circuits, Minimize logical functions using Karnaugh maps, Work with numbers in the bases 2, 8 and 16, Work with fixed and floating point representations., Show familiarity with the Intel 8086 processor, Show understanding of computer memory design, cache concepts, and bus fundamentals, Demonstrate understanding of virtual memory, process concepts, and parallel architectures.

APPLICATION DEVELOPMENT FOR MOBILE DEVICES

The course will provide an introduction to the specific mobile platform concepts, the optimizations needed for the environment and the tools available to develop effective development applications.

It will first study the basic concepts of mobile applications will be built a number of applications in order to explore the capabilities of the platform and specific exercises design is a mobile application so it is easy to Use and intuitive for end users.

At the end of the course, students will be able to reach each individual project that will enable them to practice and evaluate the knowledge acquired during the semester.

INTERNET OF THINGS

The aim of this course is to introduce the issues and basic principles of internet of things. The objectives are: Study the Internet of Things paradigm, using intelligent devices in complex information systems; Knowing the Internet of Things paradigm; Learning specific protocols for machine-to-machine communication; Developing applications on development boards using sensors and actuators; Connecting smart devices to the Internet

III Year, 2nd Semester

Nume disciplina	Cod	Puncte credit	Nr. ore/sapt				Ver
			C	S	L	P	
Discipline OBLIGATORII II							
Prelucrarea digitală a semnalelor/ Digital Signal Processing	12 D 06 O 059	3	2		1	1	E
Reţele neurale şi algoritmi genetici/ Neural Networks and Genetic Algorithms	12 S 06 O 060	3	2		2		V
Microunde/ Microwaves	12 D 06 O 102	3	2		1	1	E
Administrarea afacerilor/ Business Administration	12 C 06 O 002	2	1	1			V
Tehnologii de programare in Internet / Technologies for internet programming	12 D 06 O 103	2	2		1		E
Microcontrolere/ Microcontrollers	11 D 06 O 104	3	2		1	1	E
Disciplină OPTIONALĂ O3 EA							
Interfețe om-mașină/ Human-Computer Interaction	12 S 06 A 061	3	2		1		E
Tehnologia Microsenzorilor/ Microsensors Technology (MEMS)	12 S 06 A 065						
Disciplină OPTIONALĂ O4 EA							
Sisteme de transmisie multiplexate/ Multiplexed Transmission Systems	12 S 06 A 107	3	2		1	1	E
Aplicatiile nanotehnologiei in electronica si telecomunicatii/ Nanotechnology applications in electronics and telecommunications	12 S 06 A 108						

DIGITAL SIGNAL PROCESSING

The subject introduces the students to the Digital Signal Processing Domain. The laboratory and project are performed in Python. There are discussed continuous and digital representation, digital signals and systems, convolution, Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) digital filters and their realizations. The signals are studied in the time and in the frequency domain. Special attention is given to the compression and to the real-time processing of signals.

NEURAL NETWORKS AND GENETIC ALGORITHMS

The subject introduces the students to the artificial intelligence connectionist approach. Neural Networks (NNs) are similar in functioning to the brain - they are based on the idea of parallel and distributed

computation and the connections between the network elements are used to store the information. The laboratory is performed in Python. There are discussed model architectures (Perceptron, Feed-Forward Neural Network, Hopfield, Competitive Learning, etc..) as well as the training methods and data representation issues. There are introduced the Genetic Algorithms (GAs), a searching model inspired by the natural selection. There are presented several applications of NNs and GAs like non-linear regression, time series prediction, classification, clustering, etc... A large part of the subject is dedicated to Deep Learning and to Convolutional Neural Networks, with Keras and TensorFlow.

MICROWAVES

The course provides to the students a thorough training in the domain of the electromagnetic waves guided propagation and in the knowledge of the fundamental principles and methods utilized in the analysis and synthesis of the circuits in microwave domain. The specific objectives provided by the course refer to the knowledge of the physical phenomena specific to transmission lines and different types of waveguides (rectangular waveguide, coaxial waveguide, microstrip lines etc.). Also, there are provided basic specific knowledge about the analysis of the microwave structures using the scattering matrix formalism S.

BUSINESS ADMINISTRATION

The purpose of the course is to completely integrate the area of economic subjects thought to engineering students with an applied project in the area of business administration and entrepreneurship. Three major components comprise the course: initial analysis (marketing environment, promotion, price, distribution, product) for an organization/product, the development of future strategies with ethical, competitive and environment considerations and the implementation plan. Students are asked to complete a business plan on a new product or a new business in the market and all the mandatory steps are followed in order to actually lunch the idea in the market. Another objective of the course is to encourage team work, most of the projects are completed in a team and if it’s possible in a multicultural team.

TECHNOLOGIES FOR INTERNET PROGRAMMING

This course targets one of the main positions in information engineering industry – web application development. The course builds upon the competencies gained in Programming Languages, Introduction to Web Programming and Computer Networks courses. During the course the students learn the software architectures behind today`s web applications, Java Enterprise Edition server-side technologies, using databases and also dynamic web pages using asynchronous calls. The laboratory follows a pragmatic approach, focusing on real life programming tasks and latest web technologies. The students are required to work in teams for the final project following all the activities in a web project lifecycle

MICROCONTROLLERS

The subject presents concrete architectures for microcontrollers and highlight specific functionalities. It enhances the fundamental knowledge for the design, simulation, synthesis and testing of digital systems. Specific application will be made in which students will focus both to the component of the software and hardware (microcontroller test board, specific serial port and other peripherals. Accent is laid on the AVR family of microcontrollers, with operation modes. memory organization and registers. addressing modes, instruction set, power management, timers, interrupts, I/O ports. serial interfaces, RS232 communication bus, RS485, I2C, SPI, CAN, JTAG, applications.

HUMAN-COMPUTER INTERACTION

The aim of this course is to acquire basic knowledge concerning human-computer interface design and evaluation and to design and implement some simple specific interfaces. Course content: Human perception and memory; Human psychology, reasoning and problem solving techniques; Hardware for interfaces; Interface design principles, rules and heuristics; Interface usability evaluation; Interface implementing tools

MULTIPLEXED TRANSMISSION SYSTEMS

The main multiple access techniques used in mobile communication systems are presented as well as their implementation in existing 2nd and 3rd generation communication systems. Course content: Brief review of basic digital modulation techniques (BPSK, QPSK, M-PSK, M-ASK, M-FSK, MQAM); Presentation of the main Multiple Access Techniques used in communication systems (FDMA, TDMA, CDMA, packet radio techniques); Presentation of Spread Spectrum Techniques (Direct Sequence; Frequency Hopping, Time Hopping, UWB systems); Presentation of the main operations performed on data in a simple mobile communication system (example IS-95 standard); user identification problem; User identification and orthogonalization techniques: Walsh codes (properties, generation techniques); PN codes (properties, generation techniques), Gold codes; Example of 3rd generation communication systems (CDMA2000/UMTS)

IV Year, 1st Semester

Nume disciplina	Cod	Puncte credit	Nr. ore/sapt				Ver
			C	S	L	P	

Discipline OBLIGATORII (II)							
Procesarea imaginilor/ Image Processing	12 S 07 O 101	5	2		1	1	E
Project - Neural Networks and Genetic Algorithms	12 S 07 O 102	2				2	V
Televiziune / Television	12 D 07 O 103	4	2		2		E
Inginerie software/Software Engineering	12 S 07 O 104	4	2		1	1	E
Bazele managementului/ Fundamentals of Management	12 C 07 O 001	2	1	1			V
Disciplină OPTIONALĂ O1 EA							
Sisteme cu microprocesoare / Microprocessor Systems	12 S 07 A 110	4	2		1	1	V
Sisteme mobile şi programarea reţelelor wireless/ Mobile Systems and Programming for Wireless Networks	12 S 07 A 058						
Disciplină OPTIONALĂ O2 EA							
Transmisiuni analogice si digitale/ Analog & Digital Transmissions	12 S 07 A 111	5	2		1	1	E
Ingineria sistemelor/ Systems Engineering	12 S 07 A 057						
Disciplină OPTIONALĂ O4 EA							
Sisteme electronice programabile cu FPGA/ Programmable Electronic Systems with FPGA	12 S 07 A 114	4	2		2		E
Bioinformatica/Bioinformatics	12 S 07 A 115						

IMAGE PROCESSING

Digital Image Processing covers a wide range of methods that allow the transformation and interpretation of digitally represented visual information. This course presents the fundamentals of these methods and practical implementation examples. The course introduces the students to general digital gray level image processing and analysis techniques (the chain of operations that enable feature extraction from visual data in order to make decisions) and their implementation in general software environments (C, C++) or dedicated software (Matlab). The laboratory introduces the students to the implementation of general digital gray level image processing and analysis techniques in Matlab. The project proposes to students the software implementation (under a programming language of their choice) of selected medium-complexity image processing and analysis structures. Students acquire experience in the skills of understanding algorithm description and translating the description into software.

PROJECT - NEURAL NETWORKS AND GENETIC ALGORITHMS

The subject insures the practical usage of Neural Networks (NNs) and Genetic Algorithms (Gas). The students will create an application that will solve a real problem. They can explore the capabilities of the newest technologies - Deep Learning and Convolutional Neural Networks and instruments – Tensorflow. The applications will be run on CPU, GPU and accelerators like Google Coral and Nvidia Jetson.

TELEVISION

The course familiarizes the students with analogue and digital television systems and with video signal processing equipment. The concepts of visual perception and colorimetry are presented. Design and parameters for image acquisition sensors and image display devices and television receivers are studied. Also, the equipment for digital television studios are studied. Applications familiarize students with video signals, digital television receivers and digital television studios equipment. We study in particular the way of formation of image signals, the analysis and measurement of these signal parameters, the construction of digital terrestrial television receivers, cable and satellite receivers, the measurement of these receivers parameters, as well as the equipment used in digital TV studios, the measuring of such equipment performance and the video quality measurement in digital television systems.

SOFTWARE ENGINEERING

The aim of this course is to introduce the issues and basic principles of software engineering. The objectives are to develop a framework into which more detailed material regarding specific aspects of the software engineering process techniques and issues can fit, including requirements, verification, testing, validation and quality processes.

FUNDAMENTALS OF MANAGEMENT

The course objectives are to understand the role and importance of management in the future activity of graduates and to understand the basic technical and economic notions. Professional significance: Capacity to work with some basic technical and economic notions, to use basic tools of management and specific scientific vocabulary, acquiring of skills necessary in approaching the decision process through information and calculation. Topics: Management – art or science? Managers. Foreseeing in management. Activity organization. Directing employees. Coordination and control.

MICROPROCESSOR SYSTEMS

The subject refers to the basic and advanced elements of the design and programming microprocessor systems. It is composed of three main parts. The first part discusses about the main features and

characteristics that define the internal architecture of a microprocessor. The focus is on INTEL microprocessors. It also presents the basic elements of a microprocessor system, namely the microprocessor and its support circuits, the memory subsystem and the I/O subsystem. The second part discusses about memory hierarchy based on locality principle, design and interfacing to the system bus of the main types of memories, including EPROM, SRAM and DRAM. The last part presents the I/O subsystem, interrupts, programming and interfacing various programmable controllers. Many software and hardware examples together with design solutions are considered for various application requirements.

MOBILE SYSTEMS AND PROGRAMMING FOR WIRELESS NETWORKS

The aim of this course is to present the basic principles used in the mobile communications systems, to present the main mobile communications systems and o to introduce the main technical aspects concerning the wireless access and sensor networks.

ANALOG AND DIGITAL TRANSMISSIONS

The students will be able to understand the basics concepts of communication systems. They will be able to design and analyze communications systems based on linear, frequency and phase modulation and demodulation techniques. They will learn also how to work with digital systems. The students will be able to use measurements devices to measure the parameters of the modulated signals and to analyze and debug circuits implementing analog and digital communications systems. The students will be able to use Simulink environment to model and simulate basic communication systems.

SYSTEMS ENGINEERING

The course defines complex systems and underlines why systems engineering is needed to develop complex systems; offers knowledge related to system life cycle model and phases in a system development process, related to the relation between systems engineering and project management, risk management and quality management; gives knowledge about model-based system engineering and how to develope models in specialized languages, mainly in SysML; identifies the best systems engineering practices which can be applied to software systems engineering. The laboratory gives the knowledge and qualification of working with systems engineering tools (such as MS Project, risk plan, quality plan, SysML tools – Modelio, Visual Paradigm), to model systems via SysML diagrams, to develop a WBS and Gantt chart, to develop a systems engineering plan for a realistic project, in a small team.

PROGRAMMABLE ELECTRONIC SYSTEMS WITH FPGA

The course is an introduction to programmable circuits using the Field Programmable Gate Array (FPGA) architecture and the VHDL hardware description language. At the end of the course, students should know: Principles of fundamental digital logic; Analysis of problem-specific programming logic; Making simple circuits in VHDL language; Using the Basys 2 Spartan-3E FPGA and XILINX ISEDesign Suite; Design steps for simple solutions using programmable circuits. *Course content:* Digital Logic and Digital Design Using FPGA, Xilinx FPGA for Digilent Cards, VHDL.

BIOINFORMATICS

In this course, students learn fundamental concepts and methods in bioinformatics, a field at the intersection of biology and computing. It surveys a wide range of topics including computational sequence analysis, sequence homology searching and motif finding, gene finding and genome annotation, protein structure analysis and modeling, genomics and Single-Nucleotide Polymorphism analysis, network/systems biology, and biological knowledge discovery. It serves a gateway course for all entry-level bioinformatics graduate students. Prerequisite: students should be enrolled in the graduate program of bioinformatics, or have advanced training in at least one of the following areas: computer science, applied electronics, applied mathematics, quantitative biomedical sciences, bioengineering, biotechnology, and biostatistics.

IV Year, 2nd Semester

Nume disciplina	Cod	Puncte credit	Nr. ore/sapt				Ver
			C	S	L	P	
Discipline OBLIGATORII II							
Optoelectronica / Optoelectronics	12 D 08 O 105	5	3		2		V
Securitate si criptare / Security and Encryption	12 S 08 O 106	5	2		1	1	V
Tehnici CAD în realizarea modulelor electronice/ Electronic CAD	12 D 08 O 107	5	2		2		V
Management industrial/ Industrial Management	12 C 08 O 002	2	1	1			V
Proiectul de diploma lipsește intenționat?							
Practica pentru proiectul de diploma lipsește intenționat?							
Disciplină OPTIONALĂ O3 EA							

Arhitecturi si protocoale pentru retea integrata/ Architectures and Protocols for integrated network	12 S 08 A 112	4	2		2		V
Electronica medicala/ Medical Electronics	12 S 08 A 113						

OPTOELECTRONICS

The discipline's main objective is to familiarize students with various kinds of optoelectronic devices (such as photonic generators, optical modulators, optical waveguides, photodetectors, optoelectronic sensors etc.) in the context of their applicability, particularly to optoelectronic measuring systems or optical data transmissions. The specific objectives of this discipline are as follows:

- the understanding of the principle of operation and the performances of optoelectronic devices with applications in optoelectronic measuring systems or optical data transmissions
- the development of student's ability to correctly choose a particular type of device suited for an imposed application, by using the information provided in manufacturers' catalog sheets

SECURITY AND ENCRYPTION

The subject will cover topics such as network management, security applied to computer networks, principles of network security, cryptography, applications security, security for TCP connections, security at network layer level, network access control, firewalls, IPv6 security.

The course will present the needs for computer security and protection; it will help for a specific computer system, concerning the IT security, to identify and establish a good balance between advantages and drawbacks of any decision. The course shows different ways how to implement fundamental strategies and principles against IT criminality and for a specific security issue on a computer or computers network, design a solution to that issue.

During the practical laboratory/project part of the course, the students will develop practical skills about enabling computers security, setting up firewalls and Network Address Translation tables and policies using "iptables" software, configuring of firewalls in order to solve specific issues. During project assignments, the students will improve self-learning and team work capabilities.

ELECTRONIC CAD

The "Electronic CAD" discipline offers to students under specializing in "Applied Electronics" the possibility to reach an appropriate level of theoretical and practical knowledge in the field of EDA (Electronic Design Automation), technological electronics engineering, electronic packaging and manufacturing of electronic modules/systems. The obtained knowledge will be very useful in the future engineering life because various electronic devices, modules and systems, in all industrial areas, are managed only by the electronics engineers having a solid background in design and manufacturing. At the end of „Electronic CAD", students will be able to manage various electronic projects from the CAE-CAD-CAM design and manufacturing points of view. The engineering skills accumulated during lectures, labs and the project will offer a larger outlook on various electronics industry aspects, electronic packaging and high performance CAD software systems issues. Finally, students will have the satisfaction to understand globally the numerous every-day problems which are usually placed "onto the desk" of electronics engineers in conception and development of electronic modules/systems.

INDUSTRIAL MANAGEMENT

The purpose of this course is to offer students a broad understanding and knowledge of management applied in industrial organizations and also to bring information on the manner in which industrial units interact in national, European and international context. The objectives of this course are related to offering information that will lead to understanding and knowledge of several industrial management concepts, principles and methods. They include research & development, operations management, forecasting, scheduling, quality assurance, human resources management, finance & accounting management, and commercial management. Emphasis will be placed on the application of these concepts to actual business situations.

ARCHITECTURES AND PROTOCOLS FOR INTEGRATED NETWORK

This course is intended for students who already have basic knowledge of computer communications technologies. The general goal is to extend and deepen this knowledge, by studying core technologies and protocols used in IP networks, including Quality of Service (QoS) support for integrated networks. The course focuses on the following main topics: intra-domain and inter-domain routing, MPLS networks, congestion control and network resource management, introduction to IP QoS frameworks.

MEDICAL ELECTRONICS

The course introduces the medical applications of electronic, artificial intelligence and computer science to the students, building the mandatory common language with the medical stuff. The curriculum includes the

electric and magnetic phenomena in the body, the basic knowledge for medical applications, allowing students to understanding, study, design and correctly use the electronic systems to establish spontaneous and evocated diagnostic, to build intelligent prosthetic systems, and to implement rehabilitation and therapy systems. The laboratory introduces the students in the field of biomedical signals acquisition and processing (i.e. electrocardiogram - ECG, electromyogram - EMG, electroencephalogram - EEG, muscle contraction force, photoplethysmography. heart rate, blood pressure.