Tematică Licență CTI En – Listă Discipline

Course	**Calculus**
Contents:	1. Sequences and series of real numbers 1.1. Sequences 1.2. Numerical series 2. Limits and continuity of functions in dimension p 2.1 Limits of functions in dimension p 2.2 Continuity of functions in dimension p 3. Differential calculus in dimension p 3.1 Partial derivatives of first order. Directional derivatives 3.2 Differentiable functions of first order 3.3 First order differentiability of composite functions 3.4 Differentiability of order 2 and higher 3.5 Taylor series 3.6 Extremum points of functions in dimension p 3.7 Implicite functions 4. Integral calculus 4.1 Line integrals of first type 4.2 Double integrals 4.3 Triple integrals 4.4 Changes of variables in double and triple integrals 4.5 Applications of double and triple integrals
References::	1. G. Tigan, Differential and integral calculus, Editura Politehnica, Timişoara, 2013. 2. O. Lipovan, Mathematical Analysis, Ed. Politehnica, 2004. 3. M. Megan, Mathematical Analysis, vol.1-2, 1999.

Course	**Algebra and geometry**
Contents:	1. Linear equations : Consistency of linear equations; Cramer's rule; least square solution of a system of linear equations; homogeneous linear systems; 2. Vector spaces: Linear dependence and independence; bases and dimension; linear subspaces; 3. Linear maps: Linear maps and its matrices; the kernel and image of a linear map; 4. Eigenvalues and eigenvectors: Characteristic polynomial,eigenvalues and eigenvectors of a squared matrix; diagonalization; 5. Inner product vector spaces: The inner product and the associated norm; unit vectors, angles, orthogonal vectors; 6. Orthonormal bases; orthogonal matrices; Gramm-Schmidt Process; Linear transformations of inner product vector spaces. Orthogonal diagonalization of symmetric matrice. 7. Three dimensional geometry: The three dimensional space; geometric vectors; the dot product and cross product of two geometric vectors; orientation of three dimensional space; orthonormal frames; translation, rotation about a point in the plane, rotation about an axis in space; lines and planes in the three dimensional space; projections and distances; 8. Differential Geometry of curves and surfaces: the tangent and normals to a 3D curve. The curvature and torsion of a 3D curve. The tangent plan and the normal to a surface.
References::	1. David C. Lay, Linear Algebra and its Applications, Addison-Wesley, 2012 2. Camelia Ariesanu, Algebra liniara si geometrie analitica si diferentiala (in romanian) 3. V. A. Topogonov, Differential Geometry of Curves and Surfaces, Birkhauser, 2006

Course	**Physics**
Contents:	1. INTRODUCTION Models and methods in physics; Unit systems. 2. NEWTONIAN MECHANICS Newton's laws; Gravitational force, friction force, centripetal force, inertial force; Movement of a mass point in a force field, initial conditions; Energy, work, torque, angular momentum, moment of inertia; Theorems snd consevation laws. 3. OSCILLATIONS AND ELASTIC WAVES Simple Harmonic Motion; Superposition of two simple harmonic oscillations; Damped and Forced Oscillations; Waves equations; Energy; Interference, reflection and refraction, standing waves, attenuation, dispersion, (Doppler effect); Elements of acoustic. 4. THERMODYNAMICS Laws of themodynamics;Thermodynamic processes for ideal gas. 5. ELECTRODYNAMICS Electric charge; Electric field sources, magnetic field sources; Electric current; Maxwell's equations; The differential equations of electromagnetic waves and the linearly polarized plane solution; Polarization; Energy density of electromagnetic field and Poynting vector; 6. BASICS OF QUANTUM MECHANICS Thermal radiation-laws and context ; Photoelectric effect; Compton effect; The particle – wave duality; Heisenberg's uncertainty principle; Schrödinger's equation; Simple quantum systems: the Infinite rectangular well, the Bohr model of the Hydrogen atom; 7. PHYSICS OF THE SOLID STATE Band theory of solids; Semiconductors; The semiconductor diode; Visible light sources emission based on band theory of solids.
References::	1. V.Dorobanţu, S.Pretorian Physics Between Fear and Respect, Politehnica Publishing House, Timisoara 2009;+V. Dorobanţu, 2. Quantum Mechanics, vol. 1, Politehnica Publishing House, Timişoara, 2005; 3. Richard P. Feynman, Robert B. Leighton, Matthew Sands, The Feynman lectures on physics Addison-Wesley 1963; http://www.feynmanlectures.caltech.edu/I_toc.html http://www.feynmanlectures.caltech.edu/II_toc.html http://www.feynmanlectures.caltech.edu/III_toc.html

Course	**Computer programming**
Contents:	1. Functions as fundamental programming construct: parameters, function definition and function call, basic types, composing functions; computation vs. input/output, conditionals 2. Recursion: recurrent sequences, fractals, expressions. Mechanism of a recursive function call. Efficiency. Tail recursion. 3. Character-based I/O reading and writing characters; converting to a number; 4. Imperative programming recursion vs. iteration; assignment; loops; character-based filters 5. Internal representation representation of integers and reals; bitwise operators 6. Arrays: vectors; matrices; strings6 7. Input/output input checking and error handling; formatted I/O 8. Pointers: addresses of variables; pointer arithmetic; dynamic allocation 9. Files: text files; binary files 10. Structures ,structures and unions; defining new datatypes 11. Modularization. Abstract datatypes preprocessor; C files and headers; interface and implementation
References::	1. L. Stoicu-Tivadar, Note de curs, https://cv.upt.ro/course/view.php?id=1898 . 2. Horia Ciocârlie, Rodica Ciocârlie, Tehnici de programare şi structuri de date, Ed. Eurostampa, 2012, 3. C Programming Language, Dennis Ritchie, Brian W. Prentice Hall, 1988

Course	**Logic and discrete structure**
Contents:	1. Introduction. Statements and Truth Tables. Numbers and Divisibility. Proof Techniques. Calculability. 2. Sets. Definition of a Set. Operations on Sets. Counting finite Sets. Bags (Multisets) 3. Ordered Structures. Tuples. Lists. Strings and Languages. Relations. Counting tuples 4. Graphs and Trees. Definition of a Graph. Paths in Graphs. Graph Traversals. Trees. Spanning Trees 5. Functions. Definitions and Examples. Constructing Functions. Properties of Functions. Countability. 6. Traditional Logic. Aristotelian Logic. Types of Reasoning. Syllogisms. Laws of logic. 7. Propositional Logic. Propositional Calculus. Formal Reasoning. Applications 8. Predicate Logic. First-Order Predicate Calculus. Equivalent Formulas. Formal Proofs in Predicate Calculus
References::	1. J.L. Hein, Discrete Structures, Logic, and Computability, Third edition, Jones and Bartlett Publ. 2010 2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, 5th edition, McGraw-Hill, 2002.

Course	**English**
Contents:	1. Introductions, social networking/ social interaction,speaking about professional and personal interests; 2. Formal and informal language, awareness of style adequacy; 3. Asking for/providing information in specific communicative situations; 4. Expressing opinions, agreement, disagreement,necessity, probability, possibility; 5. Expressing numerical information (charts, trends,measure, percentage, fractions); 6. Approaching technical texts - organising and retrieving information, giving examples, paraphrasing, clarifying issues; 7. Describing products, devices, components(dimensions, shapes, features, materials);
References::	1. Baade, K., Holloway, C., Scrivener, J. & R. Turner, Business Result, Oxford University Press, 2014 2. Ibbotson, M. Cambridge English for Engineering, Cambridge, 2010 3. Tănase, D. English for Engineering Settings http://www.cv.upt.ro , 2012.

Course	**Special mathematics (probabilities and statistics)**
Contents:	1. Differential Equations: Systems of differential equations. Complex Analysis. Complex functions. Continuity. Derivability. 2. Power Series. Taylor and Laurent Series. Integration of the complex functions. Residues. Residue Theorem and Applications. 3. Experiments, Models, and Probabilities. Probability axioms,conditional probability, counting methods, independence. 4. Discrete Random Variables. Continuous Random Variables.Probability mass function, averages, variance and standard variable,probability density function 5. Random Vectors. Probability models of n random vectors, marginal probability functions. 6. Markov chains. Transition matrix. Example of three (four)-state Markov chains. Homogeneous Markov chains. 7. Stochastic Processes. Definitions and examples, type of stochastic processes, Poisson process, properties of Poisson process.
References::	1. Roy D. Yates, David J. Goodman, Probability and Stochastic Processes, John Wiley and Sons Inc., 2005. 2. Elias Wegert, Visual Complex Functions, Birkhauser, 2012. 3. J. David Logan, A First Course in Differential Equations, Springer, 2006.

Course	**Electric engineering fundamentals**
Contents:	1. Introduction 1.1. Fundamental electrical quantities （electric power and energy, electric charge and current, electric potential and voltage） 1.2. Basic circuit concepts 1.3. Active circuit elements (independent voltage and current sources, controlled sources) 1.4. Passive circuit elements (resistance, capacitance, inductance) 2. Direct current (DC) steady state circuit analysis 2.1. The Kirchhoff's Laws (KL) 2.2. Power in DC circuits 2.3. Source transformation 2.4. Linearity and superposition 2.5. Source transportation 2.6. Thevenin's and Norton's equivalence 2.7. Nodal and mesh analysis 2.8. Maximum power transfer theorem 3. Sinusoidal (AC) steady state circuit analysis 3.1. Some general definitions (instantaneous value, rms value, angular velocity, frequency, period, etc.) 3.2. Single-elements responses to sinusoidal excitations; RLC series circuit supplied with a sinusoidal voltage 3.3. The Kirchhoff's laws for AC circuits 3.4. The phasor method; symbolic representation and defining relations used in the phasor method 3.5. The phasor form of the Kirchhoff's laws 3.6. Power in AC steady states circuits 3.7. Power factor and power compensation 3.8. Maximum power transfer theorem for AC circuits 4. Fourier analysis 4.1. Some general definitions (rms value, THD factor, etc.) 4.2. Method to solve circuits with a periodical excitation 4.3. Power in circuit with periodic excitation 5. First order transient analysis 5.1. Introduction in transient analysis 5.2. The classical method of transient analysis 5.3. General method for solving all 1st order RL and RC circuits 5.4. Example that use the transient analysis
References:	1. A. E. Fitzgerald, D. E. Higgibotham, A. Grabel, Basic Electrical Engineering, McGraw-Hill; fifth edition, 1981 2. Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, McGraw-Hill; fourth edition, 2009 3. Mahmood Nahvi, Joseph A. Edminister, Electric Circuits, Schaum's Outline Series, McGraw-Hill, 2003

	(http://www.rncis.ro/portal/page?_pageid=117,70218&_dad=portal&_schema=PORTAL) pentru domeniul de studiu de la pct. 1.4 şi programul de studii de la pct. 1.6 din această fişă. 4. M. Greconici, Electric Circuits. Notes of course, http://www.et.upt.ro 5. Tonz R. Kuphaldt, Fundamentals of Electrical Engineering and Electronics, Virtual Institut of Applied Sciense, (VIAS), 2006P.

Course	**Programming techniques**
Contents:	1. Free software and intellectual property: Free software philosophy.Intellectual property, the copyright law.Digital piracy. Ethics of computing. 2. Advanced concepts in the C programming language: Structured data types. Bit fields. Functions with variable number of arguments. Command line arguments. Function pointers. The C preprocessor. 3. Files: Generalities. Text files. Binary files. Error handling while working with files. 4. Systematic design and development of large programs:Programming style. The Stepwise Refinement Method. 5. Independent compilation: Preprocessing, compiling and linkediting. Header files. External and static Symbols. 6. Recursion: Generalities. The activation record. Recursive functions in C. 7. General paradigms for designing programs: Greedy.Backtracking. Divide and Conquer. Dynamic programming. 8. Dynamic data structures: Singly linked lists. Ordered lists. Doubly linked lists. 9. Abstract data types: Implementing abstract data types in C. The Stack. Objects. Sorting techniques: Insertion based sorting. Mergesort. Timsort.
References::	1. Samuel P. Harbison, Guy L. Steele Jr., C: A reference manual, http://careferencemanual.com 2. Steven S. Skiena, The Algorithm Design Manual 3. Alana, R. Feuer, The C Puzzle Book

Course	**Digital logic**
Contents:	1 Introduction 3.2 Number representation. 3.3 Signals. 2 Boolean algebra 2.1. Logic functions. Truth tables 2.2 Axioms and theorems of boolean algebra. De Morgan's laws. 3. Combinatorial circuits. 3,1 Using truth tables for boolean functions representation. 3.2 Combinational circuits minimizations. Karnaugh maps. 3.3. Don't care input combinations 3.4. Timing hazards. Static and dynamic hazards. 4. Basic notions of VHDL 4.1. Entities and architecture. 4.2. Notions of structural modeling in VHDL. 5. Combinational circuits design 5.1. Designing decoders and encoders. 5.2. Designing multiplexers and demultiplexers 5.3. Comparators. 5.4. Binary adders, subtracters and ALUs 6. Basics of sequential logic design 6.1. Latches and flip-flops. The S-R latch 6.2 S-R latch with enable. The D latch 6.3. Edge triggered D flip-flop 6.4. Master-slave flip-flops. J-K master slave flip-flop. T flip-flop 7 State machines 7.1. State machine structure. Output logicMealy and Moore state machines. 7.2. State machines design. Characteristic equations 7.3. Analysis of state machines wirh D flip-flops 7.4. Analysis of state machine with J-K flip-flops 7.5. Counters and shift registers 7.6 Designing state machines using state diagrams. 7.7 Designing state machines using transition lists
References::	1. J. F. Wakerly. Digital Design: Principles and Practices (4th Edition). Prentice Hall, 2005 2. P. Eles, K Kuchcinski, Z. Peng: System Synthesis with VHDL, Kluwer Academic, 1997. 3. Charles H. Roth, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, Cengage Learning. 2010

Course	**Electronic devices**
Contents:	1. Semiconductors and Diodes 1.1. Electrical Conduction in Semiconductor Devices 1.2. The pn Junction and the Semiconductor Diode 1.3.Circuit Models for the Semiconductor Diode 1.4. Practical Diode Circuits 2. The Bipolar Junction Transistor (BJT) 2.1. Construction, Symbols, Nomenclature and the Transistor Effect 2.2. Fundamental Relationships. BJT Large Signal Model 2.3. Operating Modes, Connections and i-v Characteristics 2.4.The Load Line and the Operating Point 2.5. BJT Biasing Circuits. The Self-Bias Circuit 2.6. BJT Small Signal Models for Low and Midband Frequency 2.7. Small Signal Amplifiers with BJT. 3. Field Effect Transistors (FET) 6 3.1. Junction Field Effect Transistors (JFET) - Construction, symbols and nomenclature - JFET operation, DC characteristics and basic relationships - JFET biasing and the operating point - JFET small signal, midband frequency model - Applications 3.2 Metal Oxide Semiconductor Field Effect Transistors (MOSFET) - Construction, symbols and nomenclature - Operation of the n - channel enhancement mode MOSFET - MOSFET characteristics and basic equations - MOSFET biasing and the operating point - MOSFET small signal midband frequency model. The common source amplifier. - p - Channel MOSFETs and CMOS devices. Transistor gates and switches 4. Operational Amplifiers 4.1. The open - loop model. Ideal amplifier characteristics. Physical limitations of Op-Amps 4.2. The operational amplifier in the closed- loop mode. The voltage follower; The inverting amplifier, the op-amp summer and the D/A converter; The noninverting amplifier; Integrator and differentiator circuits; Comparators and A/D converters
References::	1. M. Daneti, Electronic Devices, Lecture notes, 2015, unpublished 2. C.D. Căleanu,V. Maranescu, V. Tiponuţ, A.Filip, Electronic Devices, Ed. „Politehnica" Timişoara, 2010 3. S. Ionel, Fundamente de inginerie electronică, Ed . „Politehnica" Timişoara, 2013 4. S.Ionel, Dispozitive electronice şi optoelectronice, Ed . „Politehnica" Timişoara, 2013

	5. P. Horowitz, W Hill, The Art of Electronics, 2nd Edition, Cambridge Universitz Press, 1994 6. HyperPhysics project, Semiconductors, http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.htmlManz. D, et. al., Informatica. Culegere de probleme rezolvate si propuse, Mirton, 2005

Course	**English**
Contents:	1. Expressing causes and effects, describing problemsand solutions; 2. Comparing and constrasting; 3. Describing processes and methods; 4. Discussing isssues and results; 5. Describing equipment and technologies; 6. Describing technology/equipment performance (reliability, maintenance, vulnerabilities, errors); 7. Describing a technical project, being critical and evaluating;
References::	1. Baade, K., Holloway, C., Scrivener, J. & R. Turner, Business Result, Oxford University Press, 2014 2. Ibbotson, M. Cambridge English for Engineering, Cambridge, 2010 3. Tănase, D. English for Engineering Settings http://www.cv.upt.ro , 2012.

Course	**System theory and automatization**
Contents:	1. Description and general properties of systems 1.1. Physical systems. Mathematical models. Dynamical systems 1.2. Classifications of physical and dynamical systems 1.3. Input-output models 1.4. Graphical modeling by block diagrams 1.5 Introduction to process control 2. Mathematical modeling. System identification. Linearization of nonlinear models 2.1. Basics on models. 2.2. Process identification 2.3. Continuous-time linear and nonlinear models. Linearization of nonlinear models 3. Control system structures 3.1. Continuous-time control system structures 3.2. Discrete-time control system structures. Aspects concerning the discrete-time models of continuous-time systems 4. Transfer function-based characterization of linear timeinvariant systems 4.1. Laplace transform 4.2. Z-transform 4.3. Typical deterministic input signals and sequences 4.4. Initial conditions. Specific regimes. Analytical computation of system responses 4.5. Transfer functions and transfer function matrices 4.6. Relation between state-space models and input-output models 4.7. Relation between input-output models and state-space models. State-space realizations of transfer functions.Equivalent state-space realizations 4.8. Special expression of discrete-time models 5. Discrete-time models of continuous-time processes 5.1. Zero-order hold 5.2. Computation of discrete transfer functions 5.3. Computation of discrete state-space models 5.4. Computation of discrete-time models by numerical integration of differential equations 6. Frequency domain analysis 6.1. Frequency response of continuous-time systems 6.2. Analytical computation and graphical representation of frequency response functions 6.3. Hints for the experimental computation of frequency response plots 7. Subsystems and connections. Transfer elements 7.1. Connections of (sub)systems 7.2. Technical aspects concerning the connection of physical systems 7.3. Detailed structure and transfer functions of control loops. Categories of control loops 7.4. Continuous-time system benchmarks 7.5. Discrete-time system benchmarks 7.6. Block diagram-based system analysis. 7.7. Derivation of state-space models for complex systems on the basis of block diagrams

	8. System stability 8.1. Concept of stability 8.2. Basic definitions for stability of continuous-time linear systems 8.3. Criteria for stability analysis of continuous-time linear systems 8.4. Basic definitions for stability of discrete-time linear systems 8.5. Criteria for stability analysis of discrete-time linear systems 8.6. Aspects concerning the stability analysis of control loops with continuous-time processes and discrete-time controllers 9. Control system structures and design 9.1. Control system structures 9.2. Problem setting in control system design 10. Control algorithms 10.1. Typical continuous-time control algorithms. Quasicontinuous discrete-time implementations 10.2. Guidelines to use typical control algorithms 10.3. Additional functions in structures of typical control algorithms 11. Steady-state system analysis. Performance indices 11.1. Operating regimes of control systems 11.2. Computation of steady-state values of control systems 11.3. Effects of controller types on steady-state behavior of control systems 11.4. Artificial static coefficients and output coupled systems 11.5. Performance indices for control systems design 12. Design methods for control systems 12.1. Frequency domain design 12.2. Modulus Optimum method and Symmetrical Optimum method 12.3. Experiment-based tuning of controllers 12.4. Controller design for time delay systems
References::	1. K. J. Åstrőm, R. M. Murray, Feedback Systems: An Introduction for Scientists and Engineers, Princeton University Press, Princeton, NJ, 2008 2. R. C. Dorf, R. H. Bishop, Modern Control Systems, 11th edition, Prentice-Hall, Upper Saddle River, NJ, 2008 3. S. H. Żak, Systems and Control, Oxford University Press, New York, NY, 2003 4. R.-E. Precup, S. Kovács, S. Preitl, E. M. Petriu, Editors, Applied Computational Intelligence in Engineering and Information Technology, Topics in Intelligent Engineering and Informatics, vol. 1, Springer-Verlag, Berlin, Heidelberg, New York, 2012

Course	**Data structures and algorithms**
Contents:	1. Introduction: 1.1.Generalities, 1.2.Data types, 1.3. Basic data types, 1.4.Structurated data types3 2 Algorithms: 2.1.The notion of algorithm, 2.2.Algorithms analysis, 2.3.Asymptotic notation , 2.4. Algortihms execution time determination, 2.5. The profile of an algorithm 3. Sorting Techniques: 3.1. Internal sorting, 3.2. External sorting 4. Strings: 4.1.The abstract data type strig, 4.2.ADT string implementation, 4.3.String search techniques 5 Recursive algorithms: 5.1. Introductive notions, 5.2.Using recursivity, 5.3.Examples of recursive algorithms, 5.4.Backtracking algorithms, Design techiques for recursive algorithms, 5.5.Recursive data types 6. Lists: 6.1.List data structure, 6.2.List abstract data type, 6.3.Technics for list implementation, 6.4. Linear list's applications, 6.5.Special lists: stacks and queues, 6.6.Multilist data structure, 6.7.Generalized lists, 6.8. Memory mapping 7. Table data structure: 7.1.Table abstract data type, 7.2.Table implementing techniques, 7.3.Hash tables

References::	1. V.Cretu: "Data Structures and Algorithms ", electronic support, 2014. 2. A.V.Aho, J.H.Hopcroft, J.D.Ullman: "Data Structures and Algorithms", Addison Wesley Publishing Company, 1985 3. R.Sedgewick: "Algorithms", Addison Wesley Publishing Company, 1988. 4. R.Sedgewick: "Algorithms in C++", Addison Wesley Publishing Company, 1992 5. T.H.Cormen, C.E.Leiserson, R.L.Rivest: "Introduction to algorithms", MIT Press, 1992

Course	**Object-oriented programming**
Contents:	1. Introduction 1.1 Main Characteristics of Object-Oriented Programming 1.2 First Steps in Java 2. Classes and Objects 2.1 Defining a Class. Instantiating an Object 2.2 Attributes and Methods 2.3 Java Code Conventions 2.4 Some UML Elements 3. Sending Messages 3.1 Method Overloading 3.2 Sending Parameters in Java 3.3 Class Object 4. Some Predefined Java Classes 4.1 Class String 4.2 Wrapper Classes 4.3 Operations for Input/Output 4.4 Arrays 5. Inheritance 5.1 Definition 5.2 Inherited versus Overrided Members 5.3 Composition versus Inheritance 6. Polymorphism 6.1 Definition 6.2 Open-Closed Principle 6.3 Method Overloading versus Overriding 7. Interfaces. Inner Classes 7.1 Defining an Interface 7.2 Implementing an Interface 7.3 Creating Inner Classes 8. Exceptions 8.1 Concepts 8.2 Generating Exceptions 8.3 try/catch/finally Clauses 8.4 Exception-Handling Antipatterns 9. Collections 9.1 Introducing Lists, Iterators, Sets and Maps 10. Advanced Mechanisms

	10.1 Generics 10.2 Reflection 11. Packages and more Java Classes 11.1 Defining and Importing a Package 11.2 Visibility inside and outside a Package 11.3 Concurrency in Java 12. Graphical User Interfaces 12.1 The Swing Event Model 12.2 Some Swing Components 13. Towards writing Clean Code 13.1 Frequent Desing Problems in Source Code 13.2 Characteristics of Clean Code
References::	1. Bruce Eckel. Thinking in Java, 4th edition. Prentice Hall, 2006. 2. Robert C Martin. Clean Code. A Handbook of Agile Software Craftsmanship. Prentice Hall, 2009

Course	**Digital circuits**
Contents:	1. Static and dynamic parameters of digital circuits. Diode, bi-polar transistors, MOSFET transistors 2. TTL Family. Logic Gates in TTL Family .Static parameters for TTL logic gates.Power Consumption in TTL logic devices 3. CMOS Family. CMOS Static Logic Gates. CMOS Memory Elements. CMOS Dynamic Gates. Clocking Circuits 4. Low Power Circuit Design. Low power techniques at circuit level. Low power techniques at logic and architectural level
References::	1. Mircea Stratulat, Daniela Stanescu, Circuite si semnale numerice, ed. Politehnica, 2008, Timisoara. 2. John E. Ayers, Digital Interated Circuits, CRC Press, 2003 3. Robert Jacob Baker – CMOS Circuit Design, Layout and Simulation, Wiley-IEEE Press, 3rd edition, 2010

Course	**Computer architecture**
Contents:	1. REPRESENTATION OF NUMBERS IN COMPUTING SYSTEMS 1.1. Information classification 1.2. Representation of fixed point numbers 1.3. Representation of floating point numbers 2. FUNCTIONAL ANALYSIS AND SYNTHESIS OF BINARY AND DECIMAL ADDING AND SUBTRACTING DEVICES 2.1. Serial adders 2.2. Parallel adders 2.3. Parallel subtractors 3. FUNCTIONAL ANALYSIS AND SYNTHESIS OF BINARY MULTIPLICATION DEVICES 3.1. Binary multiplication methods 3.2. Synthesis of sequential binary multiplier 3.3. Binary multiplication speedup
References::	1. J. L. Hennessy, D. A. Patterson: " Computer Architecture, Fifth Edition: A Quantitative Approach", Morgan Kaufman, editia a V-a, 2012, ISBN: 012383872X 2. M. Vladutiu: ” Computer Arithmetic: Algorithms and Hardware Implementations”, Springer, 2012, ISBN: 364218314X 3. D. A. Patterson, J. L. Hennessy: "Computer Organization and Design: the hardware/software interface", Morgan Kaufman, editia a IV-a, 2012, ISBN: 0123747503 4. R. E. Bryant, D. R. O'Hallaron: "Computer Systems: A Programmer's Perspective", Addison Wesley, editia a II-a, 2010, ISBN: 0136108040

Course	**Communication**
Contents:	1. Communication and professional excellence (communication theories and models in relation to current professional environments, employers' perceptions and expectations in terms of students' communication skills and behaviour in the workplace) 2. Professional interactions in diverse and multicultural environments (organizational communication, interpersonal communication, awareness of culturebound communication challenges, intercultural sensitivity, adequate etiquette in professional business settings, professional networking) 3. Communication challenges in the job/internship search (describing one's own educational background and professional achievements, writing employment documents (CV, letter of application) - structure and information organization, adequate style), coping with job interviews – preparations, standard and tricky questions –) 4. Successful teamwork (teamwork-related knowledge and skills – team values (shared rules, vision and commitment), team roles (task roles, relationship roles, individual roles), teamwork style (pooled, sequential, reciprocal interdependece) team disengagement) 5. Delivering presentations on technical topics (presentation techniques and strategies, describing a technical project) 6. Adequate behaviour and communication style in meetings (chairing meetings, defending viewpoints, expressing agreement and disagreement, managing conflicting viewpoints professionally) 7. Technical documentation (characteristics of technical language, characteristics of technical documents (technical reports, research reports/articles, manuals, procedures, product descriptions, update reports, maintenance instructions, sales pitches)
References::	1. Gamble, W. & T. Gamble, Leading with Communication, London, Sage Publications, 2013. 2. Hofstede, G. H., & Minkow, M., Cultures and Organizations: Software of the mind, New york, NY McGrawHill, 2010. 3. Markel, Mike, Technical Communication – Tenth edition, Boston, Bedford/St.Martin's, 2012 4. Wheelan, Susan. Creating Effective Teams (Fourth Edition), Sage Publications, 2013.

Course	**Algorithms design and analysis**
Contents:	1. Introduction 1.1. Techniques for analyzing complexity of algorithms 1.2. Proving the correctness of algorithms 2. Design by induction 3. Dynamic programming 4. Binary Search Trees 5. Balanced Binary Search Trees (AVL trees, Red-Black trees) 6. Advanced Tree Data Structures 7. Union-Find Data Structures 8. Algorithms for data compression 8.1. Huffman codes 8.2. LZW coding 9. The Graph abstract data type 10. Graph traversal algorithms 11. Articulation points, biconnected components 12. Minimum spanning trees 13. Shortest paths
References::	1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, 3rd Ed, MIT Press, 2009. 2. Thomas Cormen, Algorithms Unlocked, MIT Press, 2013. 3. Udi Manber, Introduction to Algorithms - A Creative Approach , Addison Wesley 1989

Course	**Software engineering fundamentals**
Contents:	1. Introduction (i.a., What is Software Engineering?; Why do we need it?) Software Development Processes (i.a., Waterfall model; Iterative models; Incremental Delivery; Spiral model; RUP model; Agile Methods; Extreme Programming; Scrum) 2. Requirements Engineering (i.a., Requirements engineering process basics; Requirements extraction techniques; Use cases; UML for requirements) 3. Object-Oriented Analysis (i.a., Process Overview, CRC Modelling, Modelling Heuristics, Modelling Session, UML) 4. Software Design (i.a., Architectural Design and Architectural Styles – Repository/Blackboard, Pipes and filters, Client-server, Layered; Modular decomposition; Heuristics, principles and laws in objectoriented decomposition) 5. Advanced Implementation Mechanisms (i.a., Java reflection, Java generics) 6. Software Testing (i.a., Software testing process basics; Unit testing; Integration testing; Validation testing; Regression testing; Test case design; White-box approaches – Path testing, Loop testing; Blackbox approaches – Equivalence partitioning, Boundary value analysis)
References::	1. Ian Sommerville, Software Engineering, Addison-Wesley, 2006. 2. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill, 2004. 3. Martin Fowler, UML Distilled, Addison-Wesley, 2004.

Course	**Computer networks**
Contents:	1. FUNCTIONAL ANALYSIS AND SYNTHESIS OF BINARY DIVISION UNITS 1.1. Binary division algorithms 1.2. Sequential synthesis for unsigned integer binary division 1.3. Combinational matrix structures for binary division 1.4. SRT algorithms for binary division based on rapid convergence 2. FUNCTIONAL ANALYSIS AND SYNTHESIS OF FLOATING POINT ARITHMETIC UNITS 2.1. Floating point characteristics 2.2. Sequential synthesis of floating point adders 2.3. Floating point multiplication and division 3. MEMORY HIERARCHY ORGANIZATION 3.1. Cache organization 3.2. CPU and cache performance evaluation 3.3. Virtual memory mechanisms; Calea de date la o mașină load-store 4. CENTRAL PROCESSING UNIT ORGANIZATION 4.1. Hardwired and microprogrammed control units 4.2. RISC versus CISC central processing units 4.3. Datapath for load-store machines
References::	1. R. E. Bryant, D. R. O'Hallaron: "Computer Systems: A Programmer's Perspective", Addison Wesley, 2nd ed., 2010, ISBN:0136108040 2. J. L. Hennessy, D. A. Patterson: "Computer Architecture: A Quantitative Approach", Morgan Kaufman, 5th ed., 2012, ISBN:0123704901 3. M. Vladutiu: ” Computer Arithmetic: Algorithms and Hardware Implementations”, Springer, 2012, ISBN: 364218314X

Course	**Culture and civilization**
Contents:	1. The beginning of the human civilisation 2.The cultural heritage of Mesopotamia 3. The cultural heritage of Ancient Rome 4 The cultural heritage of the Middle Ages 5 The cultural heritage of the Renaissance 6. Romania and the European Union
References::	1. Constantin Elena Claudia, Culture and civilisation,2016, http://www.ct.upt.ro/studenti/cursuri.htm 2. Constantin Elena Claudia, Cosmin Constantin Baias, 2015, Reasons for Studying the Ancient Cultures in Technical Universities , 3. http://www.sciencedirect.com/science/article/pii/S1877042815041634 4. Constantin, E.C., Communicating in multi-cultural Europe,2011, http://www.cls.upt.ro/files/conferinte/proceedings/PCTS%204- 5. 2012/04_PCTS_4_2011_Constantin_pp31_40.pdf 6. Constantin, E.C., Integration through Communication and Information,2011, 7. https://www.cabdirect.org/cabdirect/abstract/20113207599 8. Pinder, J., The European Union, Oxford, 2007; Oakland, J., British Civilisation, Routledge, 2006

Course	**Artificial intelligence fundamentals**
Contents:	1. Introduction in Artificial Intelligence 2. Problem Solving. Goal Trees. Rule-Based Expert Systems 3. Search: Depth-First, Hill Climbing, Beam,Optimal, Branch and Bound, A* 4. Games, Minimax and Alpha-Beta 5. Constraints: Search, Domain Reduction 6. Learning: Nearest Neighbors 7. Learning: Identification Trees, Disorder 8. Learning: Neural Networks 9. Learning: Genetic Algorithms 10. Learning: Boosting 11. Architectures: GPS, SOAR, Subsumption, Society of Mind
References::	1. Patrick H. Winston. Artificial Intelligence ,1993 2. Stuart Russell, Peter Norvig, Artificial Intelligence. A modern approach. 2009 3. Michael Negnevitsky, Artificial Intelligence. A guide to Intelligent system. Addison-Wesley, 2005

Course	**Databases**
Contents:	1. Introduction 1.1 Data storing methods 1.2 Database and DBMS 1.3 DBMS Facilities 1.4 Database models: hierarchical, network, relational, OO 2. ER model. XBase model 2.1 The ER model 2.2 Designing ER diagrams 2.3 xBase model for small/medium size databases 2.4 xBase navigational language 3. Indexing techniques 3.1 Data access optimization 3.2 Data sorting 3.3 Data hashing and indexing 3.4 Using indexes 4. DB Graphical Interfaces 4.1 OO facilities for interface implementation 4.2 Event based programming 4.3 Forms 4.4 Reports 5. Hierarchical and Network Data Structures 5.1 Implementing hierarchical structures 5.2 Using logical/physical links 5.3 Types of links 5.4 Implementing complex network structures 6. Relational Algebra 6.1 Relational model 6.2 Integrity constraints 6.3 Relational query languages 6.4 Relational Algebra 6.5 DB Normalization 7. SQL 7.1 SQL DDL 7.2 SQL active queries 7.3 SQL passive queries 7.4 Nested queries 7.5 Data summarization 8. DB Clients implementation 8.1 Specific API implementation. C/C++ example 8.2 Generic API: ODBC, JDBC 8.3 Web databases using PHP+MySQL 8.4 Using stored procedures

References::	1. D. Pesacru, Databses – course notes, 2013. 2. R- Ramakrishnan, J. Gehrke, "Database Management Systems", 3rd ed., ISBN 007-2465-63-8, McGraw-Hill, 2003. 3. Oracle, “Oracle Database 12c Documentation”, http://docs.oracle.com/, 2015.

Course	**Microeconomics**
Contents:	1. Art and Science of Economics 1.1. Scientific Argument. Epistemology. Fallacy. 1.2. Wants and Resources, Scarcity and Efficiency 1.3. Object and Method of Economics 2. Economic Activity resolve, debate 2.1. Division of Labour. Specialization 2.2. Production and Consumption. Opportunity Cost. Goods 2.3. Absolute Advantage Theory. Relative Advantage Theory 2.4. Production-Possibilities Frontier 2.5. Principles of Economic Activity 2.6. Mathematical Model of Economic Activity 2.7. Questions for Discussion 3. Economic Agents. Securities. Sharehold 3.1. Economic Agents. Types of Trade Companies 3.2. Equities and Bonds. Shareholders 4. Philosophy of Economic Thinking 4.1. History of Economic Thoughts 4.2. History of Romanian Economic Thinking 5. Production Factors System 5.1. Factors of Production 5.2. Capital. Genesis. Capital Movement. Capital Structure. Capital Indicators. Depreciation 5.3. Labour 5.4. Natural Resources (Soil or Land) 5.5. Neo-Factors of Production 5.6. Combination and Substitution of Production Factors 5.7. Plant Performance Indicators 5.8. Questions for Discussion 6. Producer Theory. Cost of Production 6.1. Cost of Production on Short Term Run 6.2. Cost-Profit Relationship. Management of Costs 6.3. Producer Optimum. Cost of Production on Long Term Run 6.4. Questions for Discussion 7. Factors' Productivity 7.1. Concept 7.2. Types of Productivity 7.2.1. Labour's Productivity 7.2.2. Capital's Productivity 7.2.3. Land's Productivity 7.3. Questions for Discussion 8. Incomes in Economy 8.1. Wage 8.2. Rent 8.3. Profit 8.4. Interest

	8.5. Questions for Discussion 9. Market 9.1. Concept. Functions 9.2. Types of Market 9.3. Limits of Market 10. Competition 10.1. Concept 10.2. Type of Competitive Markets Structures 10.3. Competitive Strategies 11. Demand and Supply 11.1. Concept. Demand Schedule. Supply Schedule. Demand Law.Supply Law 11.2. Demand Elasticity 11.3. Supply Elasticity 11.4. Equilibrium Price 11.5. Questions for Discussion 12. Consumer Theory. Utility 12.1. Utility of Economic Goods 12.2. Questions for Discussion 13. Types of Markets and Price Making Mechanism 13.1. Types of Prices 13.2. The Making of Prices Mechanism 13.3. Questions for Discussion
References::	1. Bărglăzan Diana, Microeconomie: concepte, indicatori, aplicaţii, Editura Eurostampa, Timişoara 2007 2. Byrns Ralph T., Stone Gerald W, Microeconomics, Scott, Foresman and Company, Glenview, Ilinois, London, 1989 (4th Edition) 3. Samuelson Paul A., Nordhaus William D., Economics, Mc-Grow-Hill Book Company, New York 1985 4. Taylor John B., Principles of Microeconomics, Houghton Mifflin Company, Boston, 1995 5. Vartolomei Mihaela, Cultură şi civilizaţie europeană contemporană, Editura Politehnica, Timişoara 2009 6. Vartolomei Mihaela, Vartolomei-M Mihael, Macroeconomie, Editura Eurostampa, Timisoara, 2009 7. Vartolomei Mihaela, Foldvary Schramko Kinga Hanna, Bazele contabilitatii. Note de curs. Aplicatii pentru seminar, Editura Eurostampa, Timisoara, 2009

Course	**Professional and ethical issues in it**
Contents:	1. Economic and workplace issues. Job dynamics. Outsourcing.Health and ergonomics. 2. Software reliability and engineering responsibilities. Computer risks. 3. Codes of professional conduct. Professional Ethics. 4. Data protection, privacy and security. Public information and records. 5. Civil liberties. Censorship. 6. Intellectual property. Copyright law, fair use. Patents. Plagiarism. 7. Software contracts and licenses. Software warranties. 8. Computer misuse. Law enforcement and forensics. 9. Computers in education. Digital divide. Network neutrality.
References::	1. Robert N. Barger. Computer Ethics - A Case-Based Approach. Cambridge Univ Press, 2008 2. Frank Bott. Professional Issues in Information Technology, BCS Learning & Development Limited, 2014. 3. George Reynolds. Ethics in Information Technology. 5th ed, CENGAGE Learning, 2015

Course	**Management and marketing**
Contents:	1.1. Evolution of management 1.2. Concept of management 1.3. Evolution of scientific management 1.4. Classic organizational theory 1.5. Behavioral approach 2. The planning function 2.1. Definitions 2.2. Strategic planning 2.3. Operational planning 2.4. Planning projects 3. Organization function 3.1. Definition 3.2. Projecting organizational structure 3.3. Elements of the organizational structure 4. Training function 4.1. Motivation 4.2. Communication skills 5. Leadership function 5.1. Levels of management 5.2. Situational theory. Leadership styles 5.3. Factors influencing leadership styles 5.4. Time management 6. Control function 6.1. Definition. Control classification 6.2. Stages of control process 7. Introduction to marketing 7.1. Defining marketing. Progress 7.2. Marketing functions 8. The product 8.1. Product features 8.2. Life cycle for products 8.3. Product mix and new product development 9. The price 9.1. Influence factors for the price 9.2. Price politics 9.3. Price mixes 9.4. Adapting prices 10. Promoting 10.1. Communication in marketing 10.2. Promotional mix elements 10.3. Advertising and publicity 10.4. Sales promotion 10.5. Keywords for sales promotion 10.5. Means of sales promotion 11. Distribution

	11.1. Defining distribution 11.2. Distribution channels 11.3. Physical distribution 12. Market research 12.1. Marketing research 12.2. Marketing information system 12.3. Marketing research stages 13. The marketing plan 13.1. Content of the marketing plan 13.2. Marketing strategies 13.3. Strategic marketing plan development stages
References::	1. G. Prostean, Management and Marketing, http://www.mpt.upt.ro/pag/50.html - courses in electronic format, 2009 2. Stephen. R Covey, The 7 Habits of Higly Effective People, Powerful Lessons in Personal Change, https://www.depts.ttu.edu/upwardbound/books/the-7-habits-ofhighly-effective-people.pdf 3. Stephen. R Covey, Principle Centered Leadership, http://credu.bookzip.co.kr/resource/englishbook/pdf/ad30099.pdf

Course	**Entrepreneurship in it**
Contents:	1. Corporate Entrepreneurship: innovation and new-business creation strategies in an existing organization. Growth models. Building revenue. Strategic orientation and constraints. 2. Startup Ideation. New concept development: Understand business concepts, Competitive offerings and customer needs; viability assessment 3. Business model development and planning. Scanning for opportunities. The Business Plan. Raising money. 4. Product planning. New venture operations and project management. Entrepreneurial financial management 5. Decision making in IT ventures. 6. Leadership in New Ventures. International Entrepreneurship. 7. Legal and Ethical Issues of Entrepreneurship 8. Technologies for Interactive Marketing. Strategic Web Development
References::	1. T.H.Byers, R.C.Dorf, A.J.Nelson. Technology Ventures: From Idea to Enterprise 4th Edition, McGraw-Hill, 2014 2. Marc J. Schniederjans, Jamie L. Hamaker, and Ashlyn M. Schniederjans. Information Technology Investment: Decision-making Methodology, 2nd Edition. World Scientific, 2010