

**UNIVERSITATEA DIN CRAIOVA**  
**DEPARTAMENTUL: COMPUTERS AND INFORMATION**  
**TECHNOLOGY**  
**LICENTA: COMPUTERS TAUGHT IN ENGLISH**

**ANUL I**

1. Mathematical Analysis
2. Linear Algebra, Analytic and Differential Geometry
3. Computer Programming
4. Physics – General Elements
5. Logical Design of Digital Computers
6. Knowledge, Human Communication and Internet
7. English
8. Special Mathematics
9. Numerical Methods
10. Introduction to Electrical Engineering
11. Computer Programming – Programming Techniques
12. Computer Programming – Programming Technique - Project
13. Digital Systems Design
14. Physics – Elements of Mechanical Engineering
15. English

**ANUL II**

1. Data Structures and Algorithms
2. Data Structures and Algorithms - Project
3. Electronics
4. Computer Architecture
5. System Theory and Control
6. Object Oriented Programming
7. Object Oriented Programming - Project
8. Management
9. English
10. Algorithm Complexity Analysis Managementul relațiilor
11. Artificial Intelligence
12. Computer Graphics
13. Assembly Programming Languages
14. Measurement Techniques
15. General Economics and Accounting
16. English
17. Practical Training

**ANUL III**

1. Digital Integrated Circuits
2. Databases
3. Operating Systems
4. Data Communication
5. Computer Structure and Organization
6. Computer Structure and Organization - Project
7. Visual Programming Environments
8. Visual Programming Environments - Project
9. Computer Networks
10. Database Design
11. Database Design - Project
12. Microprocessors System Design
13. Distributed Network Application Development
14. Distributed Network Application Development - Project
15. Verification and Testing of Computer Systems
16. Verification and Testing of Computer Systems - Project
17. Software Engineering
18. Software Engineering – Project

19. I/O Systems
20. Computer Systems Modelling
21. Practical Training

**ANUL IV**

1. Real Time Computing Systems
2. Real Time Computing Systems – Project
3. Computer Networks Management
4. E-Commerce
5. E-Commerce – Project
6. Web Applications' Design
7. Web Applications' Design – Project
8. Data Security
9. Data Security – Project
10. Models and Algorithms for Parallel Computing
11. Models and Algorithms for Parallel Computing – Project
12. Frameworks for Digital Systems Development
13. Formal Languages and Automata
14. Practical Stage for Graduation – Project
15. Embedded Systems
16. Embedded Systems – Project
17. Compiler Design
18. Compiler Design – Project
19. DSP in Communication
20. Algorithms for Information Retrieval
21. High Speed Networks
22. Expert Systems
23. Information Systems Management
24. Graphical Systems
25. VLSI Environments
26. Multimedia Application Development

## ANUL I

### 1. SUBJECT OF STUDY : MATHEMATICAL ANALYSIS

**NUMBER OF CREDITS:** 5

**SEMESTER:** I

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** The course focuses on the introduction of fundamental notions on differential and integral calculus

**COURSE CONTENT:** Introduction to differential calculus (Fundamental streams; complete metric spaces; Contraction principle; Numerical series; Series of powers, developments in series; Limits and continuity for functions with several variables; Partial derivatives and differentiability; Local extremes for functions with several variables; Implicit defined functions; Conditioned extremes). Introduction to integral calculus (Right Riemann integral; improper integrals; Integrals with parameters; Curve-linear integrals; Double and triple integrals; Surface integrals).

**TEACHING LANGUAGE:** english

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY:**

Predoi, M. , Balan, T. - Mathematical Analysis Vol I. Differential Calculus; Vol II.Integral Calculus, Ed. Universitaria, Craiova, 2005

Predoi, M. - Analiza matematica, Ed. Universitaria, Craiova, 1994

Predoi, M., Constantinescu, D., Racila, M. - Teme de calcul diferential, Ed.Sitech, Craiova, 2003

Predoi, M., Constantinescu, D., Racila, M. - Teme de calcul integral, Ed.Sitech, Craiova, 2003

### 2. SUBJECT OF STUDY : LINEAR ALGEBRA AND GEOMETRY

**NUMBER OF CREDITS:** 5

**SEMESTER:** I

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** The aim of the course is the introduction of the fundamental notions of linear algebra, analytic and differential geometry: vector spaces, linear mappings, quadratic forms, Euclidian spaces, geometric vectors, the straight line, the plane, conics and quadric surfaces, curves and surfaces. Tutorial classes allow to fix theoretical knowledge and to create calculus control by applications.

**COURSE CONTENT:** Vector Spaces; Linear Mappings; Bilinear Forms. Quadratic Forms; Euclidian Spaces; Geometric Vectors; Geometric Vectors; Straight Line and Plane; Conics and Quadric Surfaces; Curves in Plane and in Space; Surfaces

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written part, final written exam)

**BIBLIOGRAPHY:**

Vladimirescu, I., Munteanu, F., Algebră liniară, geometrie analitică și geometrie diferențială, Ed. Universitaria, Craiova, 2007

Vladimirescu, I., Matematici aplicate, Repr. Univ. Craiova, 1987.

Vladimirescu, I., Popescu, M., Algebră liniară și geometrie analitică, Ed. Univ. Craiova 1994

Vladimirescu, I., Popescu, M., Alg. liniară, geom. n-dimensională, Ed. Radical, Craiova 1996

Radu, C., Algebră liniară, geometrie analitică și diferențială, Ed. ALL, București, 1998

Vladislav, T., Rașa, I., Matematici financiare și ingineresti, Ed. Fair Partners, București, 2001

Udriște, C. ș.a., Probleme de algebră, geometrie și ecuații diferențiale, EDP, București, 1981

Stănășilă, O., Analiză liniară și geometrie, Ed. ALL, București, 2000

Munteanu, F. ș.a., Probleme de alg. liniară, geom. analitică, difer., Ed. Universitaria, Craiova, 2006

### 3. SUBJECT OF STUDY: COMPUTER PROGRAMMING

**NUMBER OF CREDITS:** 5

**SEMESTER:** I

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** The course overall objective is to provide the students with the knowledge required and to develop elementary programming skills using modern computer programming languages, C-like, such as C, C++, Java.

**COURSE CONTENT:** Introduction; Algorithmic Design; Data Structures; Language Issues; Programming in C.

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (Final exam, written + oral, Periodic Quizzes)

**BIBLIOGRAPHY:**

[A] T.H.Cormen, C.E.Leierson, R.L.Rivest, Introduction To Algorithms, MIT Press, 1990 (also translated in Romanian, Computer Libris Agora, 2000)

[A] N.Wirth, Algorithms + Data Structures = Programs, Prentice-Hall, Englewood Cliffs, 1976

[B] D.E. Knuth, The Art of Computer Programming - vol.1: Fundamental Algorithms, 3rd ed., Addison Wesley Longman, 1997 (also translated in Romanian, Ed.Teora, 1999)

[B] A.V.Aho, J.E.Hopcroft, J.D.Ullman, The Design And Analysis Of Computer Algorithms, Addison Wesley, 1974

[C] J.P.Tremblay, P.G.Sorenson, An Introduction To Data Structures With Applications, McGraw-Hill, 1984

[B] L.Livovschi, H.Georgescu, The Synthesis And Analysis Of Algorithms (in Romanian), Bucharest, 1986

[B] E.Horowitz, S.Sahni. Fundamentals of Computer Algorithms, Computer Science Press, 1984

[B] E.Horowitz, S.Sahni. Fundamentals of Data Structures, Computer Science Press, 1986

[C] R.Skvarcius, Problem Solving Using Pascal - Algorithm Development and Programming Concepts, PWS Publishers, 1984

[B] Herbert Schildt, C: The Complete Reference, McGraw-Hill Intl, 1995 (also in Romanian, Ed.Teora, 1998)

[C] H. Schildt, C++: The Complete Reference, McGraw-Hill Intl, 1995 (also in Romanian, Ed.Teora, 1997)

[B] M.Mocanu, C: A Programming Guide, Ed. Sitech, 2001 (in Romanian)

[C] R.Lafore, Data Structures and Algorithms in Java, Waite Group Press, 1998 (also translated in Romanian, Ed.Teora, 2001)

[C] J.F. Korsh, Data Structures, Algorithms and Program Style, PWS Computer Science, Boston, 1986

### 4. SUBJECT OF STUDY : LOGICAL DESIGN I

**NUMBER OF CREDITS:** 5

**SEMESTER:** I

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** An introductory course on logical design methodology, forming the basis for future stream of hardware disciplines. It is treated extensively the mathematical foundation linked to analysis and synthesis of digital devices - Boolean algebra, Switching functions and forms, Minimization procedures, Canonical forms of representation

**COURSE CONTENT:** Fundamental concepts related to Logical Design of Digital Computers (LDDC); Boolean Algebra; Switching functions; Boolean forms; Classes of Boolean functions. Complete functional systems; Canonical representation of Switching functions; Minimization of Switching functions

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written paper exam)

**BIBLIOGRAPHY :**

- Oleg Cernian, Logical Design of Digital Computers - Fundamentals, SITECH Craiova, 2005
- Oleg Cernian, Logical Design of Digital Computers - Minimization and Functional Decomposition, SITECH Craiova, 2008
- D. Lewin, D. Protheroe, Design of Logic Systems, Chapman & Hall, 1992
- Z. Kohavi, Switching and Finite Automata Theory, McGraw Hill, 1978
- V.P.Nelson, H.Troy Nagle, J.D. Irwin, B.D.Carroll, Digital Circuit Analysis & Design of Digital Systems, McGraw Hill, 1995
- S.C. Lee, Digital Circuits and Logic Design, Prentice Hall, 1976
- M.A. Harrison, Introduction to Switching and Automata Theory, McGraw Hill, 1965
- A.D. Friedman, P.R. Menon, Theory and Design of Switching Circuits, Pitman, 1975
- J. Hayes, Introduction to Digital Logic Design, Addison - Wesley, 1994
- E.J. McCluskey, Introduction to the Theory of Switching Circuits, Prentice Hall, 1965

## 5. SUBJECT OF STUDY : PHYSICS I – GENERAL PHYSICS

**NUMBER OF CREDITS:** 4

**SEMESTER:** I

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** The course focuses on the review of fundamental knowledge in general physics and applications.

**COURSE CONTENT:** Classical Mechanics; Analytical Mechanics; Electrodynamics Elements Of Quantum Physics

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written test - final)

**BIBLIOGRAPHY:**

- Florea Uliu, Curs de fizica pentru facultatea de electrotehnica, vol.1 si 2, Reprogr.Univ.Craiova 1982, 1986. Reprogr.Univ.Craiova, 1991.
- E. Luca si colaboratorii - Fizica, Editura Didactica si Pedagogica.
- I.M. Popescu si colaboratorii - Probleme rezolvate de fizica, Editura Tehnica.
- M. Puchin - Fizica, Editura Sitech.

## 6. SUBJECT OF STUDY : INTRODUCTION TO COMPUTERS AND INFORMATION TECHNOLOGY

**NUMBER OF CREDITS:** 4

**SEMESTER:** I

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** Acquiring basic knowledge on fundamentals of computer systems and information technology and developing primary skills on operating with the basic commands from Linux and writing simple scripts.

Acquiring knowledge on basic notions used in computer science, information technology and information. Understanding basic concepts on data, data codification, enumeration systems used in IT, arithmetic operations in basis other than 10. Getting first notions on systems and signals, computer systems, information systems and operating systems. Developing primary skills on operating with the basic commands from Linux and writing simple scripts

**COURSE CONTENT:** The courses are presented by using the videoprojector, with Power Point. The strategies used for transmitting and acquiring knowledge: Presentation; Interrogation; Deduction.

**Chapter 1. Engineering.**

Definitions, classifications. Computer science. Computers and Engineering. Software Engineering. Data communication Engineering. Informatics, Cybernetics. Information technology.

**Chapter 2. Information and data.**

Information. Data. Data processing cycle. Measuring units for information. Data codification. Data exploitation cycle.

**Chapter 3. Numerical representation of information.**

Enumeration systems. General conversion methods. Enumeration systems used in computer systems. The octal enumeration system. The hexadecimal enumeration system. Arithmetical operations in non-decimal basis. Binarydecimal codes. Representation of signed binary numbers. Alphanumeric codes.

**Chapter 4. Aspects of information protection , capturing and storage**

Information and communication (Shannon model for communication). Protecting the binary-decimal coded information. Protection through parity bit. Aspects of information capturing. General and particular aspects of information storage.

**Chapter 5. Introduction to the Arithmetic of Integers.**

General matters. Shift of signed binary combinations. Adding and subtracting in direct code. Adding and subtracting in complementary code. Binary multiplication (multiplication in direct and complementary code, using 3 methods).

**Chapter 6. Systems and signals**

Systems. Definitions and classifications. Signals. The concept of "mathematic model". Definitions for signals. Digital systems.

**Chapter 7. Introduction to organization and structure of digital computer systems.**

Definition and historic of digital computer systems. Main hardware components. The processor. Organization of a Computer System. Buses. Main memory. ROM, PROM, EPROM, EEPROM and flash memory. Secondary memory. Storage hierarchy. I/O ports and cables.

**Chapter 8. I/O Devices.**

Overview. Monitors. Mice. Plotters. Printers.

**Chapter 9. Introductory notions about operating systems**

Definitions. Operating systems goals and functions. Components of an operating system. Functionality of an operating system.

#### **Chapter 10. Primary notions on files management**

Basic concepts. Files. File attributes and operations with files. Types of files. Internal structure of files. Access methods.

**TEACHING LANGUAGE:** English

**EVALUATION: Verification** (written exam under the form of sets of questions)

#### **BIBLIOGRAPHY:**

1. Richard T. Watson - *Information Systems* – Global Text Project, 2007
2. J.O'Brien si G. Marakas, *Introduction to Information Systems*, Ed. McGraw Hill 2007, available at <http://www.docslide.com/intro-to-information-systems/>
3. Hongjiang Xu - *Data quality issues for accounting information systems' implementation: Systems, stakeholders, and organizational factors* - <http://www.aabri.com/manuscripts/09189.pdf>
4. Cernian Oleg - *Logical Design of Digital Computers; Fundamentals*, Ed. Sitech, Craiova, 2005
5. D. Glazer , T. Jenkins, H. Schaper , *Enteprise Content Management Technology* , Edit. Open Text Corporation, 2006, available at [http://books.google.ro/books?id=p44A6LjAle4C&dq=%22enterprise+content+management%22&printsec=frontcover&source=bl&ots=u0DEtzPL4J&sig=gdjqnZNq2EtNP\\_MpZNV5sIFoifw&hl=ro &ei=PCSSbTFM4PO-AagkI3VBA&sa=X&oi=book\\_result&resnum=5&ct=result#PPA36,M1](http://books.google.ro/books?id=p44A6LjAle4C&dq=%22enterprise+content+management%22&printsec=frontcover&source=bl&ots=u0DEtzPL4J&sig=gdjqnZNq2EtNP_MpZNV5sIFoifw&hl=ro &ei=PCSSbTFM4PO-AagkI3VBA&sa=X&oi=book_result&resnum=5&ct=result#PPA36,M1)
6. Radic Drago, "*IT - Informatics Alphabet*" , Cardinal Leger Secondary School , Brampton, Ontario, available at <http://www.informatics.buzdo.com/index.html>
7. Bradley Kjell , "*Introduction to Computer Science using Java*", Central Connecticut State University in new Britain, Connecticut, available at <http://chortle.ccsu.edu/java5/index.html#01>
8. Joe Carthy "Introduction to computer systems" , University College Dublin, available at <http://www.csi.ucd.ie/staff/jcarthy/home/CourseNotes/Web%20Comp%20Sys.pdf>
9. Pearson Ceritification, "*I/O Ports and Devices*", available at <http://www.pearsonitcertification.com/articles/article.aspx?p=1681059>
10. Nicolae Ileana-Diana, Applied Informatics, course notes in electronic format

vocabulary: *Raspberry Pi Computer Review: 'A Great Step Forward'*; 6. Grammar: The Past Simple Tense. Irregular Verbs. Spelling features of the Past Participle ("*-ed*" Form); 7. Grammar: The Past Simple Tense vs. The Past Continuous Tense.; 8. Grammar: The Present Perfect Simple Tense vs. The Past Simple Tense.; 9. Technical vocabulary: *MinecraftMaker Reveals New 'Hard Science-Fiction' Game*; 10. Technical vocabulary: *Health and Safety. Computer ergonomics. Electronic Rubbish*; 11. Grammar: The Present Perfect Simple Tense vs. The Present Perfect Continuous Tense.; 12. Technical vocabulary: *Facebook's Free Anti-Virus Marketplace Targets Malware*, Grammar: The Past Perfect Simple Tense vs. The Past Perfect Continuous Tense.; 13. *Revision*; 14. *Evaluation*

**TEACHING LANGUAGE:** English

**EVALUATION: Verification** (written exam)

#### **BIBLIOGRAPHY:**

##### **Bibliography**

1. Downing, Douglas A.; Covington, Michael A.; Covington, Melody Mauldin; Covington, Catherine Anne, *Dictionary of Computers and Internet Terms*, Hauppauge, NY: Barron's, 2009.
2. Foley, Mark; Hall, Diane, *Advanced Learner's Grammar. A Self-Study Reference & Practice Book with Answers*, Longman, 2003. 1. Fortanet-Gomez, Inmaculada; Räsänen, Christine A. (eds.), *ESP in European Higher Education. Integrating language and content. Amsterdam/Philadelphia: John Benjamins Publishing Company, 2008.*
3. Glendinning, Eric H.; McEwan, John, *Oxford English for Information Technology*, Oxford University Press, 2002.
4. Hewings, Martin, *Advanced Grammar in Use*, Cambridge University Press, 2005.
5. Ionescu-Cruțan, Nicolae, *Dicționar de calculatoare englez-român*, Editura Niculescu, București, 2007.
6. McCarthy, Michael, O'Dell, Felicity, *English Vocabulary in Use - Advanced*, Cambridge University Press, 2004.
7. Murphy, Raymond, *English Grammar in Use. A self-study reference and practice book for intermediate students of English*, Cambridge University Press, 2009.
8. Prodromou, Luke - *Grammar and Vocabulary for First Certificate*, Longman - Pearson Education Limited, 2006.
9. Remacha Esteras, Santiago; Marco Fabre, Elena - *Professional English in Use - For Computers and the Internet* Cambridge University Press, 2007.
10. Side, Richard; Wellman, Guy, *Grammar and Vocabulary for Cambridge Advanced and Proficiency*, Longman, 2006.
11. Thomson, A.J., Martinet, A.V., *A Practical English Grammar*, Oxford University Press, 1997.
12. Vasile, Sergiu Adrian, *Dicționar de informatică aplicată și tehnologia informației*, Craiova, Editura Sitech, 2009.
13. Vince, Michael, *Advanced Language Practice. English Grammar and Vocabulary. 3rd Edition*, Macmillan, 2009.
14. Zamfira, Alina-Roxana, *Grammar and Vocabulary for IT Students. Course Resources*, Craiova,

## **7. SUBJECT OF STUDY : ENGLISH I**

**NUMBER OF CREDITS:** 2

**SEMESTER:** I

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:** Acquiring specialized knowledge in the English language and using it in technical contexts.

Acquiring general theoretical knowledge of English morphology and syntax; Acquiring technical terminology which is specific to the field of computers and using it in relevant contexts; Developing the autonomy of speech in English.

**COURSE CONTENT:** 1. Introduction; The bibliography - Course Resources; 2. Grammar: The Numeral; 3. Grammar: Verbs not Normally Used in the Continuous Aspect; The Place of Frequency Adverbs; 4. Technical vocabulary: *GCCQ-Backed Competition Names Cyber Security Champion*, Grammar: The Present Simple vs. The Present Continuous. Spelling Features of the ING-form.; 5. Technical

Editura Universitaria, 2012.

15. \*\*\* *Longman Dictionary of Contemporary English*, Pearson Education Limited, 2008.

Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein: *Introduction to algorithms*. MIT Press, 2001.

## 8. SUBJECT OF STUDY : NUMERICAL METHODS

**NUMBER OF CREDITS:** 5

**SEMESTER:** II

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** The course is designed to present the main numerical methods and numerical algorithms. It also aims to enhance the ability of analysing different mathematical models in the engineering field, using the numerical techniques and to solve specific problems by turning the numerical methods into programming languages.

**COURSE CONTENT:** 1 Numerical methods in algebra ; 2 Function approximation; 3 Numerical methods for integral approximation; 4 Numerical methods for differential equations and partial differential equations;

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written examination)

**BIBLIOGRAPHY:**

Burden R. L., Faires J. D., *Numerical Analysis*, Brooks Cole Ed., 2004.

C de Boor, *A practical guide to splines*, 2nd ed. Springer, New York, 2000.

Ciarlet P.G., *Introduction à l'Analyse Numérique et l'Optimisation*, Ed. Masson, Paris, 1990.

Chatelin F., *Spectral approximation of linear operators*, Academic Press, New York, 1983.

Demidovici B., Maron I., *Éléments de Calcul Numérique*, Ed. Mir Moscou, 1973.

Ebâncă D., *Metode numerice in algebră*, Editura Sitech, Craiova, 2005.

Mihoc Gh., Mîcu N., *Teoria probabilităților si statistică matematică*, E. D.P., Bucuresti, 1980.

Militaru R., *Méthodes Numériques. Théorie et Applications*, Ed. Sitech, Craiova, 2008.

Philips G., Taylor T., *Theory and Applications of Numerical Analysis*, Academic Press, 1999.

Popa M., Militaru R., *Analiză Numerică*, Note de curs, Ed. Sitech, Craiova, 2003.

Popa M., Militaru R., *Metode numerice - algoritmi și aplicații*, Ed. Sitech, Craiova, 2007.

## 9 SUBJECT OF STUDY : COMPUTER PROGRAMMING – PROGRAMMING TECHNIQUES

**NUMBER OF CREDITS:** 5

**SEMESTER:** II

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** The aim of this course is to introduce students to basic algorithms and techniques of their systematic implementation and evaluation using usual programming languages (eg. C).

**COURSE CONTENT:** 1. Introduction to algorithms and programming techniques; 2. Basic algorithms analysis. Testing and correctness; 3. Sorting algorithms; 4. Data types. Lists ; 5. Stacks and queues. Dynamic memory allocation; 6. Graphs and trees; 7. Dynamic programming; 8. Greedy algorithms; 9. Graph algorithms; 10. Backtracking; 11. Combinatorial algorithms; 12. Special algorithms.

**TEACHING LANGUAGE:** english

**EVALUATION:** Exam (written exam containing)

**BIBLIOGRAPHY::**

## 10. SUBJECT OF STUDY : LOGICAL DESIGN II

**NUMBER OF CREDITS:** 5

**SEMESTER:** II

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The fundamental mechanisms of designing and implementing digital devices at MSI level: ULMs, extension methods, structured realization of digital networks, programmable logic devices, sequential machines and networks, specification of sequential machines, state reduction, flip-flops, general synthesis procedure, analysis procedure, ASM charts, implementation of ASMs.

**COURSE CONTENT:** 1. Combinational Logic Networks (CLN); 2. CLN implementation with Programmable Logic Device (PLD); 3. Introduction to Sequential logic Networks 4. Simplification of Sequential Logic Networks; 5. Sequential Logic Networks with PLDs; 6. Design of digital systems

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (oral and practical examination)

**BIBLIOGRAPHY:**

V.P.Nelson, H.Troy Nagle, J.D. Irwin, B.D.Carroll, *Digital Circuit Analysis & Design of Digital Systems*, McGraw Hill, 1995

S.C. Lee, *Modern Switching Theory and Digital Design*, Prentice Hall, 1976

D. Lewin, D. Protheroe, *Design of Logic Systems*, Chapman & Hall, 1992

Z. Kohavi, *Switching and Finite Automata Theory*, McGraw Hill, 1978

S. Lee, *Design of Computers and other Complex Digital Devices*, Prentice Hall, 2000

M.D. Ercegovac, T.Lang, *Digital Systems and Hardware/Firmware Algorithms*, John Wiley & Sons, 1985

J.P. Hayes, *Introduction to Digital Logic Design*, Addison - Wesley, 1994

A.D. Friedman, P.R. Menon, *Theory and Design of Switching Circuits*, Pitman, 1975

F.P. Prosser, D.E. Winkel, *The Art of Digital Design*, Prentice Hall, 1987

D.J. Comer, *Digital Logic and State Machine Design*, Holt, Rinehart & Winston, 1984

J.W. Carter, *Digital Design with Programmable Logic Devices*, Prentice Hall, 1997

T.L. Floyd, *Digital Fundamentals*, Prentice Hall, 2000.

## 11. SUBJECT OF STUDY : ELECTROTECHNICS

**NUMBER OF CREDITS:** 4

**SEMESTER:** II

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The main objective of this discipline is to provide the students with the most important notions on electromagnetic fields and electric circuits (the most important laws and theorems and techniques to solve common problems in various operating regimes). The lab has the role to help students to get practical abilities correlated to the theoretical notions presented at the course.

**COURSE CONTENT:** 1. Electric circuits in permanent sinusoidal periodic regime (A.C. regime); 2. Electric circuits in D.C. regime; 3. Linear electric circuits in periodic non-sinusoidal permanent regime (PNSR) ("distorting regime"); 4.

Electric circuits in transient regime; 5. Two-port networks and filters; 6. Three-phase power systems;

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written and oral examination)

**BIBLIOGRAPHY:**

Gregory Anne, Relatiile publice in practica, Editura All Beck, 2005.

Newsom D., Totul despre relatii publice, Editura Polirom, 2003.

Miculescu Simona, Relatii publice din perspectiva internationala, Editura Polirom 2006.

\*\*\*, Pachetul de programe OpenOffice

Nicolae, P.M., Electromagnetics I, Ed. UNIVERSITARIA, Craiova, 1997

Sora, C., Bazele electrotehnicii, EDP Buc., '82

Preda, M., Cristea, P., Bazele electrotehnicii, EDP Buc., '82

Mocanu, C. I., Teoria circuitelor electrice, EDP, Buc. '82

Preda, M., et al., Analiza topologica a circuitelor electrice, EDP Buc.

Badea, M., Bazele electrotehnicii, Reprogr. Univ. Cv., vol. I., (1977), vol II, (1979)

Cook, D.M., The Theory of Electromagnetic field, New Jersey, Prentice Hall, 1975

Marshall, S.V., Skitek, G.G., Electromagnetic Concepts and Applications, New Jersey, Prentice Hall, 1995

Rao, N.N., Elements of Engineering Electromagnetics, New Jersey, Prentice Hall, 1993

Kraus, A., Circuit Analysis, West Publishing Company, 1991

**12. SUBJECT OF STUDY: PHYSICS II – ELEMENTS OF MECHANICS**

**NUMAR DE CREDITE :** 4

**SEMESTER:** II

**TYPE OF COURSE :** fundamental

**COURSE OBJECTIVES:** It is one of fundamental disciplines. The course foccuses on the introduction of basic concepts with respect to the problematics of methods used to build mathematic models for the movement of mechanical systems with constant mass and a finite number of freedom degrees. Their analysis is accompanied by calculation examples and applications that reveals the studied methods.

**COURSE CONTENT:** 1 Slipping vectors' theory; 2 Geometry of masses; 3. The Kinematics of material points; 4 The Kinematics of rigid solid bodies and of rigid systems; 5 Dynamics

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification ( final exam)

**BIBLIOGRAPHY:**

Bagnaru, D., Cataneanu, A., Mecanica-Mecanisme, Editura Sitech, Craiova, 19972.

Buculei, M., Mecanica, vol. I, II, Reprografia Universitatii din Craiova, 19803.

Cataneanu, A., Mecanica, vol. I,II, Editura Universitaria, Craiova, 2000, 20014.

Cataneanu, A., Mecanica – Culegere de probleme Ed. Universitaria, Craiova, 20025.

Ceausu, V, Enescu, N., Ceausu, F., Culegere de probleme, Mecanica, vol. I. Statica si cinematica, Ed. Printech, Bucuresti, 19976.

Darabont, A., Vaiteanu, D., Munteanu, M., Mecanica tehnica. Culegere de probleme, Ed. Scrisul Romanesc, Craiova, 19837.

Ispas, V., Aplicatiile cinematicii in constructia manipuloarelor si robotilor industriali, Ed. Academiei Romane, Bucuresti 19908.

Mangeron, D., Irimiciuc, N., Mecanica rigidelor cu aplicatii in inginerie, Vol. I, II, III, Ed. Tehnica, Bucuresti, 1978, 1980, 19819.

Merches, I., Burlacu, L., Applied Analytical Mechanics, The Voice of Bucovina Press, Iasi, 199510.

Staicu, St., s.a, Probleme de mecanica teoretica. Mecanica analitica, Universitatea Politehnica Bucuresti, 199611.

Voinea, R., Voiculescu, D., Simion, F. P., Introducere in mecanica solidului rigid cu aplicatii in inginerie, Ed. Academiei, Bucuresti, 1989.

**13. SUBJECT OF STUDY : PRINCIPLES OF ACCOUNTING AND GENERAL ECONOMICS**

**NUMBER OF CREDITS:** 4

**SEMESTER:** II

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:** The appropriation, by the students of the fundamental notions in the field of accountancy, the knowledge and the understanding of the procedures specific to the accountancy method; The understanding of the terminology specific to the financial-accounting field; The formation of a logical thinking in what concerns the transposition in accounting language of the main economical-financial operations that generates the activity developed by the economical agents; The understanding of the methodology and the work technique specific to accountancy.

**COURSE CONTENT :** 1. The object and the method of accountancy; 2. The accounting representation of the patrimony and of the financial results; 3. The accounting evaluation of the patrimonial structures; 4. Justificative documents and accounting bookkeepings; 5. The account and the double registering in accountancy; 6. The inventory of the patrimony; 7. The verification balance; 8. The annual financial statement.

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written exam)

**BIBLIOGRAPHY:**

Brabete Valeriu, Dragan Cristian – Bazele contabilitatii conforme cu directivele europene, Editura Universitaria, Craiova, 2007.

Staicu Constantin – Bazele contabilitatii moderne, vol.1, Editura Scrisul Românesc, Craiova, 2003.

Staicu Constantin (coordonator) – Bazele contabilitatii moderne, vol.2, Editura Universitaria Craiova, 2004.

Sandu Maria (coordonator) – Bazele contabilitatii, Editura Scrisul Românesc, Craiova, 2005.

Calin Oprea, Ristea Mihai – Bazele contabilitatii, Editura National, Bucuresti, 2001.

Epuran M., Babai\_a V. - Teoria generala a contabilitatii, Editia a Ila, Editura Mitron, 2002.

**14. SUBJECT OF STUDY : ENGLISH II**

**NUMBER OF CREDITS:** 2

**SEMESTER:** II

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:** Acquiring specialized knowledge in the English language and using it in technical contexts.

Acquiring general theoretical knowledge of English morphology and syntax;

Acquiring technical terminology which is specific to the field of computers and using it in relevant contexts; Developing the autonomy of speech in English.

**COURSE CONTENT:** 1. Technical vocabulary: *Microsoft Offers Sneak Preview of Windows 8 Grammar: Means of Expressing Futurity: The Present Continuous; The be going to Form; The Future Simple Tense.*; 2. Grammar: Means of Expressing Futurity: *Will + infinitive* versus *The be going to Form; The Future Continuous Tense.*; 3. Grammar: Means of Expressing Futurity: *Will + infinitive* versus *The Future Continuous Tense; Won't + infinitive* versus *The Future Continuous Negative; Second Person Interrogative: will you and Other Forms; Shall and Will.*; 4. Grammar: Time Clauses; *The Future Perfect Tense; The Future in the Past.*; 5. Writing: *Informal Letters/Emails*; 6. Technical vocabulary: *Swiftkey, a Scientific Start-up Grammar: The - ING Participle.*; 7. Technical vocabulary: *Learning to Code Grammar: The Gerund.*; 8. Grammar: *The Infinitive.*; 9. Writing: *The CV*; 10. Grammar: *The Passive Voice.*; 11. Technical vocabulary: *Student Scholarship*; 12. Writing: *The Covering Letter*; 13. *Revision*; 14. *Evaluation*

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written exam)

**BIBLIOGRAPHY:**

1. Downing, Douglas A.; Covington, Michael A.; Covington, Melody Mauldin; Covington, Catherine Anne, *Dictionary of Computers and Internet Terms*, Hauppauge, NY: Barron's, 2009.
2. Foley, Mark; Hall, Diane, *Advanced Learner's Grammar. A Self-Study Reference & Practice Book with Answers*, Longman, 2003. 1. Fortanet-Gomez, Inmaculada; Räsänen, Christine A. (eds.), *ESP in European Higher Education. Integrating language and content. Amsterdam/Philadelphia: John Benjamins Publishing Company, 2008.*
3. Glendinning, Eric H.; McEwan, John, *Oxford English for Information Technology*, Oxford University Press, 2002.
4. Hewings, Martin, *Advanced Grammar in Use*, Cambridge University Press, 2005.
5. Ionescu-Cruțan, Nicolae, *Dicționar de calculatoare englez-român*, Editura Niculescu, București, 2007.
6. McCarthy, Michael, O'Dell, Felicity, *English Vocabulary in Use - Advanced*, Cambridge University Press, 2004.
7. Murphy, Raymond, *English Grammar in Use. A self-study reference and practice book for intermediate students of English*, Cambridge University Press, 2009.
8. Prodromou, Luke - *Grammar and Vocabulary for First Certificate*, Longman - Pearson Education Limited, 2006.
9. Remacha Esteras, Santiago; Marco Fabre, Elena - *Professional English in Use - For Computers and the Internet* Cambridge University Press, 2007.
10. Side, Richard; Wellman, Guy, *Grammar and Vocabulary for Cambridge Advanced and Proficiency*, Longman, 2006.
11. Thomson, A.J., Martinet, A.V., *A Practical English Grammar*, Oxford University Press, 1997.
12. Vasile, Sergiu Adrian, *Dicționar de informatică aplicată și tehnologia informației*, Craiova, Editura

*Sitech, 2009.*

13. Vince, Michael, *Advanced Language Practice. English Grammar and Vocabulary. 3rd Edition*, Macmillan, 2009.
14. Zamfira, Alina-Roxana, *Grammar and Vocabulary for IT Students. Course Resources*, Craiova, Editura Universitaria, 2012.
15. \*\*\* *Longman Dictionary of Contemporary English*, Pearson Education Limited, 2008.

**15. SUBJECT OF STUDY: SPORT I**

**NUMBER OF CREDITS:**

**SEMESTER:** II

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

Executarea corectă a exercitiilor de educație fizică. Perfecționarea abilităților în jocurile de echipă.

**COURSE (SEMINAR) CONTENT:**

1. Cunoașterea și organizarea colectivului de studenți. Prezentarea cerințelor catedrei de Educație Fizică și Sport.
2. Perfecționarea elementelor din școala alergării.; Perfecționarea elementelor de mișcare în teren la jocul de baschet. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete.
3. Perfecționarea prinderii și pasării mingii cu două mâini - baschet. Perfecționarea pasului lansat în tempo moderat. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete.
4. Perfecționarea ieșirii la minge și opririle într-un timp și doi timpi. Perfecționarea simțului în alergare în tempo moderat. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete.
5. Alergarea în viteză - perfecționarea pasului alergător de accelerare și a pasului lansat de viteză. Perfecționarea opririlor și pivotării în jocul de baschet. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete.
6. Perfecționarea startului de jos și lansarea de la start. Perfecționarea dibringului în jocul de baschet. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete.
7. Perfecționarea finisului și trecerea liniei de sosire. Perfecționarea aruncării la cos de pe loc și din saritură. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete.
8. Alergarea în viteză 30 - 50 metri cu start de jos. Perfecționarea elementelor învățate - complex de exerciții - baschet. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete.
9. Repetarea și consolidarea sariturii în lungime fără elan, cu accent pe desprindere și aterizare. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete. Dezvoltarea forței: abdomen, spate, flotări, mobilitate.
10. Perfecționarea sariturii în lungime fără elan - global. Joc bilateral: baschet, volei, fotbal, tenis de masă, aerobic - fete. Dezvoltarea forței: abdomen, spate, flotări, mobilitate.
11. Proba de control - saritura în lungime fără elan,

verificarea progresului. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.

12. Probe de control: forta; din culcat dorsal - flexii ale trunchiului (numar de repetari in 30 sec.); - din culcat facial - extensii ale trunchiului (numar de repetari in 30 sec.); - flotari (numar de repetari - pentru fete sprijin pe genunchi).

**TEACHING LANGUAGE:**

**EVALUATION:**

**BIBLIOGRAPHY:**

## **16. SUBJECT OF STUDY: SPORT II**

**NUMBER OF CREDITS:**

**SEMESTER:** II

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

Executarea corecta a exercitiilor de educatie fizica. Perfectionarea abilitatilor in jocurile de echipa.

**COURSE (SEMINAR) CONTENT:**

1. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 2. Alergare in viteza - starturi din diferite pozitii.

Reacomodarea cu mingea de basket. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 3. Repetarea si consolidarea elementelor de gimnastica exersate in semestrul I. Repetarea si consolidarea conducerii mingii, oprirea, aruncarea la cos. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete. 4. Repetarea si consolidarea elementelor de gimnastica exersate in semestrul I.

Complexe tehnice compuse din dribling, opriri, aruncari la cos din diferite pozitii. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 5. Repetarea si consolidarea elementelor de gimnastica exersate in semestrul I. Complexe tehnice - joc bilateral: basket; 6. Repetarea si consolidarea sariturii in lungime de pe loc, cu accent pe desprindere. Repetarea si consolidarea driblingului, aruncarii la cos de la distanta. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 7. Repetarea si consolidarea sariturii in lungime de pe loc, cu accent pe aterizare. Pase in 2 - 3 jucatori cu aruncare la cos din alergare, dribling si saritura. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 8. Alergare de viteza - repetarea pasului alergator de accelerare. Aruncari la cos de penalitate - accent pe corectitudinea executiei. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 9. Alergare de viteza - repetarea pasului lansat de viteza. Repetarea patrunderilor si demarajul - basket. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 10. Alergare de viteza - repetarea stratului de jos si lansarea de la start. Complexe tehnice cu elementele invatate - basket. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 11. Alergare de viteza - repetarea sosirii si a finisului.

Complexe tehnice cu elementele invatate - basket. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 12. Proba de control: alergare de viteza pe 50 metri. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 13. Proba de control: saritura in lungime fara elan. Joc

bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.; 14. Proba de control: alergare de rezistenta - 800 metri fetesi 1.000 metri baieti. Joc bilateral: baschet, volei, fotabl, tenis de masa, aerobic - fete.

**TEACHING LANGUAGE:**

**EVALUATION:**

**BIBLIOGRAPHY:**

## **DISCIPLINE FACULTATIVE**

### **17. SUBJECT OF STUDY: LABOUR LEGISLATION**

**NUMBER OF CREDITS:** 4

**SEMESTER:** II

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

Competencies on knowing, using and applying of labor legislation.

Acquiring the required knowledge for: applying the national, European and international labor legislation and social security; - elaborating strategies, politics and procedures required for the application of labor legislation and social security; - writing official papers for labor legislation and social security; - approval of documents specific to labor legislation and social security; - reconciling conflicting situations; - analysis of disciplinary offenses; providing specialty consultancy for labor legislation and social security;

**COURSE CONTENT:** 1. Consultancy in problems of HR.; 2. Labor jurisdiction. Conflicts of rights. Material and territorial conflict resolution work. Deadlines for initiating court.; 3. Judicial practice in labor litigations.; 4. Presenting relevant shoulders of the settled by the courts, related conclusion, modification, suspension and termination of individual employment contract, individual and collective dismissal.; 5. Internal regulations. Mandatory and optional clauses . Analysis of some clauses of the regulation and internal procedures.; 6. The procedure for employment and labor detachment of foreign citizens in Romania.; 7. Analysis of the terms of a collective bargaining agreement at the unit level, in accordance with the actual legal provisions.; 8. Remuneration and payment related policies for performance of staff, staff salaries expenditure efficiency, and performance-oriented efficiency and motivation and retention of talented employees by introducing variable bonuses.; 9. Usefulness of wage studies in building a competitive salary system. Presentation of case studies from those encountered in practice in payroll activity.; 10. Evaluation of employees performance and variable pay. The necessity of implementing a performance appraisal process in the current economic context, in accordance with the new provisions of the "Labor code". Method for performance evaluation.; 11. Improving employees. Identify training needs. Training of employees.; 12. Conflicts of interest. Triggering and resolving conflicts of interest. Strike. Conditions for triggering the strike. Obligations of the party during the course of the strike. Methods of termination of the strike. Jurisprudence.

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written probe)

**BIBLIOGRAPHY:**

1. Bloy, Marjorie available at <http://www.historyhome.co.uk/peel/factmine/factory.htm> "The Factory Question", 2009
2. "Minimum wage (guaranteed)". European

Foundation for the Improvement of Living and Working Conditions, 2006.

3. "Statutory Regulations In British Employment Law". Access Solicitor. 2013.

4. I.T. Stefanescu , Codul muncii si legislatie conexa - Legislatie consolidata si Index. Ed. Universul juridic, 2012

5. I.T. Stefanescu, Tratat teoretic si practic de drept al muncii Ed. a II-a, Ed. Univers juridic, colectia tratate, 2014

## 18. SUBJECT OF STUDY: ENTREPRENEURSHIP

**NUMBER OF CREDITS:** 3

**SEMESTER:** II

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:** Competencies on knowing, using and applying of methods and techniques of management within some teams working on business evaluation, of business opportunities and of entrepreneurship initiatives.

Knowing the mechanisms for conducting and correct management of business. Correct delimitation of notions on entrepreneurship and management. Creating decisional abilities specific to business starting and running. Acquiring the required knowledge for business analysis, diagnosis, control evaluation. Developing capacities to elaborate business strategies. Developing abilities for correct management of risks in business. Developing components for business planning.

**COURSE CONTENT:** 1. Entrepreneurship and spirit of entrepreneur people. Examples on entrepreneurship activities, characteristics and typology of entrepreneurs. 2. Entrepreneurship and business initiative. Examples on entrepreneurship situations.; 3. Economic opportunities. Examples on size, categories of sources and major challenges of business opportunities.; 4. The business plan - tool to emphasize the entrepreneurship goals. Case study (business plan, feasibility study).; 5. Business establishment and starting. Case study for providing resources for assests in order to start business.; 6. Entrepreneurial management. Particular features of management within SME and business administration.; 7. Entrepreneurial strategies at business level. Case studies. Entrepreneurial training. Evaluating the entrepreneurial potential of entrepreneurs. Evaluation questionnaires. Entrepreneurial consultancy. Examples of externalization of consulting services.

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written probe)

**BIBLIOGRAPHY:**

1. Aulet, B. 24 steps to a successful startup. Disciplined Entrepreneurship. Wiley , 2007

2. Masters, B., O; Reilly, T., Jamison, J. a.o. Creative entrepreneurship, available at <http://kbsp.vc/book.html>.

Blanchard, K., Johnson, S., The One Minute Manager, Ed. William Morrow and col, 10013.

## ANUL II

### 1. SUBJECT OF STUDY : DATA STRUCTURES

**NUMBER OF CREDITS:** 5

**SEMESTER** III

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The main goal of the discipline is the development of skills regarding the design and implementation of various data structures that allow writing performing programs, improving the skills regarding the representation of static objects as well as working with dynamic objects. Another goal is learning how to control the performance of the program against to the ratio of consumed memory/execution Speed.

**COURSE CONTENT:** 1. Tree structures; 2. Search trees; 3. Optimal search trees; 4. Height balanced trees; 5. Multiway trees; 6. B trees; 7. Graf structures;

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (final written exam)

**BIBLIOGRAPHY:**

Burdescu D.D. - Algoritmi si structuri de date, Ed. Mirton, 1992.

Burdescu D.D. - Structuri de date arborescente, Ed. Mirton, 1993.

Burdescu D. D. - Structuri de date arborescente (curs) - Reprografia Universitatii din Craiova, 1993.

Burdescu D.D. ,Brezovan M - Algoritmi si structuri de date in C si Pascal (indrumar de laborator), Reprografia Universitatii din Craiova, 1995.

Burdescu D. D., Brezovan Marius, Cosulschi Mirel - Structuri de date arborescente in C si Pascal (indrumar de laborator), Reprografia Universitatii din Craiova, 2000.

Burdescu D.D. ,Badica Costin - Structuri de date (culegere de probleme ) Reprografia Universitatii din Craiova, 1994.

Tremblay, Jean Paul, Sorenson, Paul - An Introduction to Data Structures with Applications - Mc Graw-Hill, 1984.

Weiss, Mark Allen - Data Structures and Algorithm Analysis, Benjamin - Cummings, Publishing Company 1992.

Horowitz Ellis - Fundamentals of Data Structures in PASCAL, Computer Science Press 1983

Cormen Thomas, Leiserson Charles, Rivest Ronald – Introduction to Algorithms, M.I.T. Press 1992"

### 2. SUBJECT OF STUDY : SPECIAL CHAPTERS IN MATHEMATICS I – DISCRETE MATHEMATICS

**NUMBER OF CREDITS:** 5

**SEMESTER:** III

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** The course represents several chapters of mathematics in respect to their utility as instruments of investigation in engineering and specific language of the specific matter. The seminar follows the topics of the course.

**COURSE CONTENT:** 1. Elements of complex analysis; 2. Ordinary Differential Equations; 3. Elements of Fourier Analysis

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (exam and oral examination)

**BIBLIOGRAPHY:**

Predoi M., Bălan T. Mathematical Analysis, Ed. Universitaria, Craiova, 2005

- Bălan T., Dăneț C., Ecuatii diferențiale, Ed. SITECH, Craiova, 2007
- Bălan T., Șterbeți C., Analiză complexă, Ed. MJM, Craiova, 2003
- Bălan T., Șterbeți C., Analiză Fourier, Ed. SITECH, Craiova, 2001

### 3. SUBJECT OF STUDY: COMPUTER SYSTEMS ARCHITECTURE

**NUMBER OF CREDITS:** 5

**SEMESTER:** III

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** A discipline aiming at presentation of basic concepts related to computer architecture: forms of information representation in digital computers, Von Neumann's principles and model, Instruction cycle, General organisation of the CPU, Elementary Educational Computer Classification of digital computers, Machine level language, System bus, Bus arbitration, Stacks, Interrupts, Memory addressing techniques.

**COURSE CONTENT:** 1 Number representation in digital computers; 2 Architecture – organisation correlation; 3 Von Neumann's principle, Instruction Cycle, CPU ; 4 Elementary Educational Computing; 5 Input/Output; 6 Memory hierarchy and Addressing Techniques; 7 Conventional machine level

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (oral examination)

**BIBLIOGRAPHY:**

- Oleg Cernian, Computer Architecture, vol. 1, SITECH Craiova, 2005
- Oleg Cernian, Computer Architecture, vol. 2, SITECH Craiova, 2008
- W. Stallings, Computer Organisation and Architecture, Prentice Hall, 2000
- S.G. Shiva, Computer Design and Architecture, Marcel Dekker, 2000
- A.S. Tannenbaum, I.R. Goodman, Structured Computer Organisation, Prentice Hall, 1998
- M.M. Mano, Computer System Architecture, Prentice Hall, 1993
- J.P. Hayes, Computer Architecture and Organisation, McGraw Hill, 1998
- Oleg Cernian, Introduction to Computer Engineering, SITECH Craiova, 1997
- A.J. Goor, Computer Architecture and Design, Addison - Wesley, 1989
- M.R. Zargham, Computer Architecture, Single and Parallel Systems, Prentice Hall, 1995
- D.A. Patterson, J.L. Hennessey, Computer Organisation and Design, Hardware/Software Interface, Morgan Kaufmann, 1998
- xxx MCS - 80 Users Manual Santa Clara, INTEL Corporation, 1977

### 4. SUBJECT OF STUDY: OBJECT ORIENTED PROGRAMMING

**NUMBER OF CREDITS:** 5

**SEMESTER:** III

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The objectives of the course are to introduce the main concepts of the object-oriented paradigm, and also to introduce the main characteristics and principles of the C++ language. The objectives for the applications are to allow students to write software programs

using C++ as the first object-oriented language, and also to allow students to use the Visual C++ integrated framework in order to write small and medium software applications.

**COURSE CONTENT:** A. Introduction to Object Oriented Design: 1. Programming Paradigms; 2. The C Language Extensions in the C++ Language; 3. Defining and Using Classes; 4. Constructors and Destructors; 5. Namespaces; B. Basic Elements of Object Oriented Design: 6. Object Composition ; 7. Classes Hierarchies ; 8. Nested Classes. Friend Functions and Friend Classes; 9. Operator Overloading; C. Advanced Elements of Object Oriented Design: 10. Polymorphism and Virtual Functions; 11. Parameterized Functions and Classes. The Template Mechanism; 12. Exceptions; D. Standard Libraries of the C++ Language: 13. IOSTREAMS; 14. Generic Programming. The STL Library

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam + homework)

**BIBLIOGRAPHY:**

- Thinking in C++, Bruce Eckel, Prentice Hall, 2000 (electronic free)
- The C++ Programming Language, Bjarne Stroustrup, Addison-Wesley, 1997
- Effective C++, Scott Meyers, Addison-Wesley, 1996
- C++ Primer, Stanley Lippman, Josee Lajoie, Addison-Wesley, 1998
- Andrei Alexandrescu, Programarea moderna în C++, Programare generica si modele de proiectare aplicate, Teora, 2002

### 5. SUBJECT OF STUDY: SYSTEM THEORY

**NUMBER OF CREDITS:** 4

**SEMESTER:** III

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** This course deals with the fundamental problems of systems theory, both continuous-time and discrete-time. There are presented theoretical and practical methods regarding analysis, design and implementation of control systems.

**COURSE CONTENT:** 1. Description and general properties of systems. Introduction; Abstract systems; Oriented systems; 2. Linear time-invariant systems (LTIS); 3. Discrete time systems (DTS); 4. Nonlinear dynamical systems; 5. Control systems; 6. Special topics on systems theory. Time variable linear systems. Distributed parameters systems. Optimal control systems. Stochastic control systems. Intelligent control systems. Fuzzy logic and neural network based control

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (final written exam)

**BIBLIOGRAPHY:**

- Marin C., Lectures on System Theory, Editura SITECH Craiova, 2006, ISBN 978-973-746-362-3
- Marin C., Petre E., Popescu D, Ionete C., Selisteanu D. System theory, Problems, Editura SITECH Craiova, 2006, ISBN 978-973-746-437-8, 308 pg.
- Kailath T. Linear Systems, Prentice-Hall , 1980.
- Kuo, B., Automatic Control Systems, Prentice-Hall, 1991.
- Philips, Ch.; Nagle, T., Digital Control System Analysis and Design, Prentice-Hall, 1984.
- Bennett, S., Linkens, D.D., Computer Control of Industrial Processes, Peter Peregrinus, 82.
- Min, L.J., Schrage, J.J., Designing Analog and Digital Control Systems, John Wiley, 1988.

## 6. SUBJECT OF STUDY : ELECTRONICS

**NUMBER OF CREDITS:** 5

**SEMESTER:** III

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The course covers introduction to analysis, design and simulates building blocks and different analogue IC applications. This course involves laboratory practices and home works on experiment modules and extensive use of industry-standard CAD tools, such as Analog Workbench. Using the knowledge gained through Electronics, students will learn how to measure the characteristics of devices and circuits and the building of basic electronic circuits.

**COURSE CONTENT:** 1. Semiconductor diodes; 2. Junction Bipolar Transistors; 3. Field-Effect Transistors; 4. Amplifiers; 5. Signal generators; 6. Voltage regulators

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (final written exam)

**BIBLIOGRAPHY:**

Niculescu E., Purcaru D.M., Electronic Devices and Circuits. Vol. I. Ed. Universitaria, Craiova, 2002 (in Romanian).

Allen, P. and Holberg, D., CMOS Analog Circuit Design, 2nd Ed., Oxford, 2002.

Niculescu E., Purcaru D.M., Maria, M., Electronics. Simulations, analysis, and experiments, Ed. Reprograph, Craiova, 2006 (in Romanian).

Spânulescu, I., Semiconductor Devices and Analogue Integrated Circuits, Ed. Victor, Bucuresti, 1998 (in Romanian).

Gray, P.E., Meyer, C.R., Analogue Integrated Circuits. Analysis and Design, Ed. Tehnica, Bucuresti, 1997 (in Romanian).

Dascalu, D. s.a., Electronic Devices and Circuits. Problems. Ed. Didactica si Pedagogica, Bucuresti, 1982 (in Romanian).

Manolesu, A., Manolescu, A., Linear Integrated Circuits. Problems. Ed. Stiintifica si Enciclopedica, Bucuresti, 1987 (in Romanian).

## 7. SUBJECT OF STUDY: ENGLISH III

**NUMBER OF CREDITS:** 2

**SEMESTER:** III

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:** To optimize the ability to express oneself verbally and in writing while considering the specificity of the group and individuals. Improving English competence and performance aims to improve students' perception and understanding of specialized technical literature, to increase students' interest for participation in technical debates, negotiations and science conferences, to write and deliver academic presentations in their field of specialty.

Students will be better equipped to manage academic information delivered in English (in written or verbal form); Students will better cope with the challenges of working in an English dominate environment (either in Romania or in another country).

Students learn to emphasize their personal and professional skills in CVs and Cover letters and increase their performance at job interviews in the fiels of computer technology.

**COURSE CONTENT:** 1. **The science of computing.**

Reading comprehension and extension based on scientific papers: Specialized text analysis with a special view on the rhetorical devices for impersonality and objectivity in scientific texts (impersonal constructions, passive structures etc.); 2. **Tabletop computing and other modern technologies:** Listening comprehension, listening to lectures on scientific subjects. Summarizing the content, formulating opinions, debating ideas, pairwork.; 3. **Attending a technology convention.** Listening comprehension, listening to verbal communication in post-conference debates, summing up the debate, expressing critical views, role play.

4. **Technology: friend or foe?** Reading comprehension: scientific text analysis of the structural characteristics of neative and positive adjective constructions, adverbs. Oral skills: visualization of a scientific debate presenting a controversial problem thematically close to the written text studied before. Debate on the visualized document.; 5. **What makes a good website?** Writing skills: making a review; understanding conventions of colloquial vs. standard English texts with special interest to identify and use nominal phrases, verbal phrases, adjective constructions.

Developing academic speaking skills; making informal and formal presentations; 6. **Neural networks and artificial intelligence.** Reading comprehension: text analysis of grammatical elements used to classify and evaluate content. Oral skills: visualization of a scientific debate presenting advantages and disadvantages. Debate on the topic.; 7. **Programming languages: man inside the machine** Writing and speaking skills : conversion from colloquial standard English into scientific style. Oral skills: expressing opinions about writing with power in academic computing.

8. **What's in a dot?** : Analysis of the use of coordination and punctuation in scientific texts and in programming to avoid ambiguities. Oral skills: pair work debates, arguing one side of the story; 9. **What can one do with a good computer?** Reading comprehension: Analysis of the usage of scientific nominal structures in describing computer performance.; 10. Writing skills: Exercises to practice premodifiers of adjectives in scientific texts Oral skills visualization of a scientific debate presenting a controversial problem thematically close to the written text studied before. Debate on the visualized element.; 11. **A good job in computing** Writing skills: Describing professional skills and personal qualities in cover letters. Oral skills: Discussions and debates during job interviews.; 12. Writing skills: **Drawing up Curriculum Vitae in Europass format** for the field of computing; Oral skills: discussing International professional requirements for computing jobs. 13. **Revision and exam preparation;** 14. **Evaluation**

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written exam)

**BIBLIOGRAPHY:**

1. Adams, V., *An Introduction to Modern Word-Formation.* London., 1973
2. Boncea, Irina Janina, *English for Engineering,* Editura Universitaria, Craiova, 2013
3. Brookes, M, Lagoutte, F, *English For The Computer World; Teora, 2001*
1. Downing, Douglas A.; Covington, Michael A.; Covington, Melody Mauldin; Covington, Catherine Anne, *Dictionary of Computers and Internet Terms,* Hauppauge, NY:

- Barron's, 2009
2. *Foley, Mark; Hall, Diane, Advanced Learner's Grammar. A Self-Study Reference & Practice Book with Answers, Longman, 2003.*
  4. Glendinning, E, McEwan, J, *Oxford English For Information Technology*, Oxford University Press, 2003
  5. Otman, G, *Engleza Pentru Internet*, Teora, 2002
  3. *Side, Richard; Wellman, Guy, Grammar and Vocabulary for Cambridge Advanced and Proficiency, Longman, 2006.*
  6. Vince, M, *Advanced Language Practice*; Macmillan Publishers, 2003;
  7. Warner A. *English Style*. London, 1961.
  8. *Williams, I., English for Science and Engineering, Thomson, 2007.*

#### 8. SUBJECT OF STUDY : MATHEMATICS II - PROBABILITY AND STATISTICS

**NUMBER OF CREDITS:** 4

**SEMESTER:** IV

**TYPE OF COURSE:** fundamental

**COURSE OBJECTIVES:** Knowledge of the basic notions and technics in the probability and statistics theory (Bayes theory). Teaching of the main probabilistic and statistic models used in informatics, computer engineering and communications. Understanding of the main theoretical aspects by simulations: building of the probabilistic model (corresponding to some real problems) and its simulation.

Acquiring theoretical knowledge and skills of calculation for: - using basic elements of probability theory (discrete random variables , keep the main probability distributions); - simulating random variables; - using random patterns based on stochastic processes (Markov chains , queue systems); - estimating parameters in statistical models; - using statistical models in artificial intelligence.

**COURSE CONTENT:**

1. Events and probabilities, heuristic introduction to Probability Theory; 2. Random variables and distribution functions; 3. Continuous random variables , Markov inequality, Chebyshev inequality, Law of large numbers; 4. The main continuous probability distributions; 5. Simulation of random variables; 6. The notion of stochastic process. Markov property. Applications and examples; 7. Application of probability theory to study the queue systems; 8. Introduction in statistics for engineering and inferential statistics; 9. Estimators of parameters of statistical models (mean, variance , covariance, veridicity maximum); 10. Central limit Theorem; 11. Estimating confidence intervals; 12. Statistical models in artificial intelligence. Bayesian statistics bases; 13. Regression in statistics and machine; 14. Bayesian networks.

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (evaluation - written exam)

**BIBLIOGRAPHY:**

1. V. Balan, D.C. Burada, *Matematica si statistica*, Ed. Arves, Craiova 2011.
2. J. L. Johnson, *Probability and Statistics for Computer Science*, Wiley & Sons, 2003 (Biblioteca Departamentului de Matematica).
3. Gh. Mihoc, N. Micu, *Teoria probabilitatilor si statistica matematica*, Bucuresti, Editura Didactica si Pedagogica, 1980.
4. E. Petrisor, *Probabilitati si statistica. Aplicații în economie*

și inginerie, Editura Politehnica, Timisoara, 2007

5. E. Petrisor, *Modele probabilistice si statistice in stiinta si ingineria calculatoarelor*, Editura Politehnica, Timisoara, 2008
6. E. Petrisor, *Probabilități și statistică cu aplicatii in computer science*, curs si culegere de probleme, online.
7. I. Vladimirescu, *Probabilitati si statistica*, Note de curs, Informatica, Universitatea din Craiova, 1996.
8. I. Vladimirescu, *Teoria probabilitatilor si statistica matematica*, Culegere de probleme, Editura Universitaria, 2002.

#### 9. SUBJECT OF STUDY: COMPUTER STRUCTURE AND ORGANIZATION

**NUMBER OF CREDITS:** 4

**SEMESTER:** IV

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** It is envisaged to familiarize students with fundamentals of computer arithmetic, computer organisation, memory and input-output systems, computer system quality evaluation.

**COURSE CONTENT:** 1. Fundamentals of computer arithmetic; 2. Organization and structure of a RISC processor; 3. Hierarchical structure of the computer memory; 4. Input/Output blocks; 5. Computer system performance analysis

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written paper exam)

**BIBLIOGRAPHY:**

- David A. Patterson, John L. Hennessy – *Computer Organization and Design – third edition revisited*, Elsevier Inc., 2007
- Sivarama P. Dandamudi – *Guide to RISC Processors for Programmers and Engineers – Springer Science+Business Media Inc.*
- Andrew S. Tanenbaum - *Structured Computer Organization – Fourth Edition*, Prentice-Hall, Inc. 2001
- Mostafa Abd-El-Barr, Hesham El-Rewini – *Fundamentals of Computer Organization and Architecture - John Wiley & Sons, 2005*
- Hesham El-Rewini, Mostafa Abd-El-Barr – *Advanced Computer Architecture and Parallel Processing - John Wiley & Sons, 2005*

#### 10. SUBJECT OF STUDY : ARTIFICIAL INTELLIGENCE

**NUMBER OF CREDITS:** 4

**SEMESTER:** IV

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The aim of this course is to introduce students to the concepts and methods of artificial intelligence with a focus on representation and reasoning in classical logic. The cover will also cover an introduction to logic programming with Prolog.

**COURSE CONTENT:** 1. Introduction to artificial intelligence; 2. Representation and reasoning using definite clauses; 3. Proof with definite clauses; 4. Utilizing the representation and reasoning system of definite clauses; 5. Problem solving using state-space search; 6. Heuristic search; 7. Constraint satisfaction problems; 8. Knowledge representation; 9. Uncertainty in knowledge and reasoning; 10. Planning; 11. Machine learning

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY:**

- David Poole, Alan Mackworth, Randy Goebel : Computational Intelligence. A Logical Approach. Oxford University Press, 1998.
- Stuart Russell, Peter Norvig. Artificial Intelligence: A Modern Approach, Prentice Hall, 2002.
- Costin Badica, Inteligenta artificiala. Reprezentare si rationament, Editura Universitaria.

**11. SUBJECT OF STUDY : COMPUTER GRAPHICS****NUMBER OF CREDITS:** 4**SEMESTER:** IV**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The course will introduce the basic concepts regarding computer graphics, fundamental transformations, and the structure of a graphics engine and the operations that take place in this engine.

The laboratory has the purpose of putting into practice the studied information and implement them in C++.

**COURSE CONTENT:** 1. Mathematical Aspects for Computer Graphics; 2. Geometrical Models ; 3. Geometrical Transformations ; 4. Modeling and Simulation Transformation Chain; 5. Visualization Transformation Chain

**TEACHING LANGUAGE:** English**EVALUATION:** Exam (written test)**BIBLIOGRAPHY:**

- Dorian Dogaru – Grafica pe calculator. Elemente de geometrie computationala – vol.1., Editura didactica sipedagogica, Bucuresti, 1995
- James Foley, Andries van Dam, Steven Feiner, John Hughes – Computer Graphics: Principles and Practice – Addison Wesley, 1993
- Alan Watt – 3D Computer Graphics - Addison Wesley, 2000
- James Foley, Andries van Dam, Steven Feiner, John Hughes, Richard Philips – Introduction to ComputerGraphics – Addison Wesley, 1993

**12. SUBJECT OF STUDY: OBJECT ORIENTED DESIGN****NUMBER OF CREDITS:** 4**SEMESTER:** IV**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The main objective is to train future computer engineers how to develop software applications which are easy to maintain and extend.

Introduction in the basic principles of object oriented programming and design. The students will learn how to minimize complexity, how to apply and respect encapsulation and abstractions, to implement methods and classes with the right cohesion, how to reduce coupling and increase reusability, the importance of names, proper use of exceptions, proper use of comments. They will start learning to make code reviews, recognize “code smells” and methods of refactoring. Also, the most important architectural and design patterns will be introduced.

The students will learn Java language in order to practice during laboratory hours the skills acquired through this discipline.

**COURSE CONTENT:**

1. Introduction in Object Oriented Design;
  - 1.1 Objectives (reducing complexity). 1.2. KISS. 1.3. YAGNI 1.4. DRY 1.5. Open Close Principle.
2. Classes and objects; Encapsulation (bundling and information hiding, accessors, smells for broken encapsulation, how to refactor.) 2.2.

Defining classes in Java. 2.3. Creating objects 2.4. Object references and garbage collector.

3. Rules about Class Methods; Method cohesion (Definitions and classification, identification, how to refactor). 3.2. Cyclomatic Complexity. 3.3. Rules about parameters.

4. Class cohesion;

4.1. Single Responsibility Principle. 4.2. LCOM4 4.3. How to refactor in order to obtain class cohesion.

5. Class Coupling;

5.1. Abstractions and OCP. 5.2. Dependency Inversion Principle. 5.3. Defining, implementing and extending interfaces in Java 5.4. Interface Segregation Principle. 5.5. Law of Demeter (one accepted form, two smells, how to refactor) 5.6. Dependency Injection Frameworks

6. Ottinger’s Rules;

7. Inheritance

7.1. Inheritance in Java. 7.2. Extending behaviour 7.3. Favor composition over inheritance (justification, implementation, Composite, Decorator Design Pattern. Adapter Design Pattern. Facade Design Pattern.). 7.4. Polymorphism and OCP 7.5. Liskov Substitution Principles. 7.6. Abstract Classes in Java 7.7. Polymorphism Smells (how to refactor, Template Design Pattern, State Pattern). 7.8. Strategy Pattern (definition, implementation, when to use) 7.9. Visitor Design Pattern and alternatives to this design pattern.

8. Exception in Java. Use of exceptions.

9. GUI Architectures

9.1. Introduction in Swing. 9.2. Observator/Observable Design Pattern 9.3. Command Pattern. 9.5. Model-View-Controller 9.6. Model-View-Presenter

10. Object-Relational Patterns

10.1. Repository Design Pattern. 10.2. Data Mapper. 10.3. Unit of Work. 10.4. Identity Map. 10.5. Lazy Load (Proxy). 10.6. Abstract Factory. 10.7. ORM

11. Comments

12. Improving performance vs. Design.

**TEACHING LANGUAGE:** English**EVALUATION:** Exam (final writing exams)**BIBLIOGRAPHY:**

1. \* - Wikipedia.
2. \* - <http://www.objectmentor.com>.
3. Beck, Kent - Test Driven Development: By Example, Addison-Wesley, 2002.
4. Evans, Eric - Domain-Driven Design: Tackling Complexity in the Heart of Software, Addison-Wesley Professional, 2004.
5. Freeman, Eric & Sierra, Kathy & Bates, Bert - Head First Design Patterns, O’Reilly, 2004.
6. Fowler, Martin & Beck, Kent - Refactoring: improving the design of existing code, Addison-Wesley, 1999.
7. Fowler, Martin & Rice, David & Foemmel, Matthew – Patterns of Enterprise Application Architecture, Addison-Wesley, 2002.
8. Gamma, Erich & Johnson, Ralph & Vlissides, John & Hel, Richard - Design Patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley, 1994.
9. Henney, Kevlin - 97 Things Every Programmer Should Know: Collective Wisdom from the Experts, O’Reilly, 2010.
10. Hunt, Andrew & Thomas, David - The Pragmatic Programmer: From Journeyman to Master, Addison-Wesley Professional, 1999.

11. Martin, Robert C. - Agile Software Development, Principles, Patterns, and Practices, Prentice Hall, 2009.
12. Martin, Robert C. - Clean code: a handbook of agile software craftsmanship, Prentice Hall, 2009.
13. McConnell, Steve - Code complete, Microsoft Press, 2004.
14. Meyer, Bertrand - Touch of Class: Learning to Program Well with Objects and Contracts, Springer, 2009.
15. Ottinger, Tim - Ottinger's Rules for Variable and Class Naming, <http://www.objectmentor.com/resources/articles/naming.htm>

### 13. SUBJECT OF STUDY: ELECTRONIC MEASUREMENTS, SENSORS AND TRANSDUCERS

**NUMBER OF CREDITS: 4**

**SEMESTER: IV**

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:**

It contributes to the training of future engineers specialized in computers and information technology, ensuring their basic knowledge and practical skills in the field of electronic measurements, sensors and transducers.

Using theories and specific tools (algorithms, charts, models, protocols, etc.) to explain the operation and structure of hardware, software and communication systems Theoretical foundation of the features for the designed systems. Description of the structure and operation of hardware, software and communication components. Explaining the role, interaction and operation of hardware, software and communication system components.

Implementation of hardware, software and communication system components. Using interdisciplinary knowledge, solution patterns and tools to conduct experiments and interpret their results. Applying solution by means of engineering tools and methods. Benchmarking, including experimental evaluation of solving alternatives for performance optimization. Developing and implementing computer-based solutions for specific problems.

Identifying and describing defining elements of the performance of hardware, software and communication systems. Explaining the interaction of factors determining the performance of hardware, software and communication systems. Application of methods and underlying principles for increasing the performance of hardware, software and communication systems. Developing professional solutions for hardware, software and communication systems based on increasing of performance. The use of interdisciplinary knowledge to adapt the computer system against the requirements of application domain. Life cycle management, integration and integrity of hardware, software and communication systems. Doing a project including problem identification and analysis, design and development, demonstrating understanding of the need for quality.

**COURSE CONTENT:**

**Chapter 1. Introduction:** - Elements of measurement techniques. Measurement errors. - Characteristics of measurement devices and systems. - Specific digital measurement operations;

**Chapter 2. Signal conditioning circuits:** - Instrumentation amplifiers; - Instrumentation Amplifiers; - Isolation Amplifiers; - Voltage comparators; -Sampling circuits; - Analog to digital and digital to analog converters;

**Chapter 3. Sensors, transducers and multisensory systems:** - Sensors and transducers classifications; - Operating principles of sensors and transducers; - Intelligent sensors and transducers; - Multisensory systems

**Chapter 4. Electronic devices for measurement and visualization:** - Principles of measurement of electrical current, resistance and temperature using the multimeter; - Analog ammeters, voltmeters, ohmmeters; - Digital voltmeters; - Digital multimeters; - Oscilloscopes.

**Chapter 5. Intelligent measurement systems:** - The structure of an intelligent measurement system; - Intelligent measurement system with incremental rotary encoder; - Intelligent system for measuring the force; - Intelligent system for monitoring electrical parameters

**TEACHING LANGUAGE: English**

**EVALUATION: Verification** (partial written examination, final written examination)

**BIBLIOGRAPHY:**

1. Purcaru D.M., *Senzori și traductoare. Vol. I*, Editura Reprograph, Craiova, 2001.
2. Purcaru D., *Măsurări electronice*, Editura Universitaria, Craiova, 2004.
3. Purcaru D.M., *Sisteme senzoriale. Metode și algoritmi pentru recunoașterea tactilă a formelor*, Editura Sitech, Craiova, 1997.
4. Purcaru D.M., *Tehnici de măsurare - curs* (Material didactic în format electronic), <http://electronics.ucv.ro/dpurcaru>
5. Farden, I *Handbook of Modern Sensors*, 3rd Edition, AIP PRESS Springer, Advanced Monitor Corporation, San Diego, USA, 2003.
6. Regtien, P.P.L., *Sensors for Mechatronics*, Elsevier, 2012.
7. Nihtianov, S., *Smart Sensors AndMEMS*, Woodhead Publishing, 2014.
8. Dumitriu, A.; Bucsan, C. Damian, T *Sisteme senzoriale pentru roboți*, Ed. MEDRO, Bucuresti, 1996.
9. Hesse, J, Garden, J. W., *Sensors in Manufacturing*, vol. I, II, Ed. Willy - VCH, Verlag GmbH, 2001.
10. Ignea A. Stoiciu D., *Măsurări electronice, senzori și traductoare*, Editura Politehnica, Timișoara, 2007.
11. Ionescu G., ș.a, *Traductoare pentru automatizări industriale. Vol. I*, Editura Tehnică, București, 1985.
12. Ionescu G., ș.a, *Traductoare pentru automatizări industriale. Vol. II*, Editura Tehnică, București, 1996.
13. Sinclair, I., *Sensors and Transducers. Third edition*, Newness, 2001.

### 14. SUBJECT OF STUDY: English IV

**NUMBER OF CREDITS: 2**

**SEMESTRE : IV**

**TYPE OF COURSE :** complementary

**COURSE OBJECTIVES:** To optimize the ability to express oneself verbally and in writing while considering the specificity of the group and individuals. Improving English competence and performance aims to improve students' perception and understanding of specialized technical literature, to increase students' interest for participation in

technical debates, negotiations and science conferences, to write and deliver academic presentations in their field of specialty. Students will be better equipped to manage academic information delivered in English (in written or verbal form). Students will better cope with the challenges of working in an English dominated environment (either in Romania or in another country). Students learn to emphasize their personal and professional skills in CVs and Cover letters and increase their performance at job interviews in the fields of computer technology.

**COURSE CONTENT :**

**1. The National Science Foundation**

- Relative pronouns in scientific writing
- Using technical dictionaries for scientific research and translation
- Expressing opinion-arguing for/against

**2. Measuring and Comparing Research and Development in Computers**

- Listening: R&D Indicators - Present tenses - Interpreting statistics - Reading for gist & rephrasing

**3. Input Devices: Working out a Logical Sequence**

- Using abbreviations and acronyms - Past tenses - Phrasal Verbs; -Using Diagrams and tables-Writing and interpreting

**4. Developing a New IT Product**

- Listening: Generating Ideas - techniques - Future tenses
- Role-play - coordinating an R&D team
- Presenting/reviewing a new product- Oral presentations

**5. Testing an IT Product**

- Managing a debate;
- If clauses
- Building a questionnaire;
- Role-play: interviews and team work

**6. Expert Knowledge in IT Related Fields**

- Taking notes and expanding on them -writing a review
- Science and Technology Conferences- Making a scientific presentation
- Comparing and contrasting, arguing for and against

**7. Coordinating a Computer System**

- Fishing for a software engineering job- job interviews; - Speaking about oneself: Professional skills vs personal interests; -Organizing a debate

**8. Computerization and Its Role**

- Speaking about future trends-means of expressing future actions -Making generalizations and exemplifying -Writing research articles

**9. Monologue for Windows**

- Writing faxes and memos
- Expressing appreciation/ discontent regarding operating systems -Creative writing/ speaking: metaphors and idioms in scientific language

**10. Digital Research Bounces Back**

- Tools of the past reinvented -Comparing and contrasting - Definitions and exemplification

**11. Robotics**

- Modal verbs and adverbs 1 -Rediscovering shades of meaning - Expressing knowledge and lack of it

**12. The World Wide Web**

- Time clauses
- Information transfer- evaluating -Giving advice on technical issues

**13. Revision and exam preparation**

**14. Evaluation**

**TEACHING LANGUAGE: English**

**EVALUATION: Verification** (written exam)

**BIBLIOGRAPHY:**

1. Adams, V., *An Introduction to Modern Word-Formation*. London., 1973
2. Boncea, Irina Janina, *English for Engineering*, Editura Universitaria, Craiova, 2013
3. Brookes, M, Lagoutte, F, *English For The Computer World*; Teora, 2001
4. Downing, Douglas A.; Covington, Michael A.; Covington, Melody Mauldin; Covington, Catherine Anne, *Dictionary of Computers and Internet Terms*, Hauppauge, NY: Barron's, 2009
5. Foley, Mark; Hall, Diane, *Advanced Learner's Grammar. A Self-Study Reference & Practice Book with Answers*, Longman, 2003.
6. Glendinning, E, McEwan, J, *Oxford English For Information Technology*, Oxford University Press, 2003
7. Otman, G, *Engleza Pentru Internet*, Teora, 2002
8. Side, Richard; Wellman, Guy, *Grammar and Vocabulary for Cambridge Advanced and Proficiency*, Longman, 2006.
9. Vince, M, *Advanced Language Practice*; Macmillan Publishers, 2003;
10. Warner A. *English Style*. London, 1961.
11. Williams, I., *English for Science and Engineering*, Thomson, 2007.

**15.SUBJECT OF STUDY: PRACTICAL STAGE**

**NUMBER OF CREDITS: 4**

**SEMESTRE : IV**

**TYPE OF COURSE : domain**

**COURSE OBJECTIVES:** The purpose of the discipline is practicing computer programming skills (computer programming, object oriented programming, algorithms and data structures, programming techniques).

The goal is understanding theoretical concepts by applying them in practical applications.

**COURSE CONTENT:**

**1. Algorithms and Data Structures:** Binary Search Trees,

AVL Trees, Splay Trees, B/B+ Trees, Trie Trees, Graphs

**2. Tehnici de programare:** Recursion, Arrays, Searching, Files, BackTracking, Dynamic Programming, Greedy, Lists, Trees

**3. Object Oriented Programming:** C++ Programming, Classes, Nested Classes, Inheritance and Class Hierarchy, Overloading methods and operators, Polimorphism and virtual functions, I/O in C++

**TEACHING LANGUAGE: English**

**EVALUATION: Verification**

**BIBLIOGRAPHY:**

1. M. Brezovan. Programare orientata pe obiecte in limbajul C++, Ed. SITECH, Craiova, 2008, ISBN 978-606- 530-0934
2. M. Brezovan, E. Ganea. Elemente de programare vizuala utilizand Visual C++ si biblioteca MFC. Ed. SITECH, Craiova, 2007, ISBN 978-973-746-475-0
3. Bruce Eckel, Thinking in C++
4. Standard for Programming Language C++, Working Draft
5. Bruno R. Preiss, Data Structures and Algorithms with Object-Oriented Design Patterns in C++
- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, Introduction To Algorithms (3rd ed.), MIT

## DISCIPLINE OBLIGATORII

### DISCIPLINE FACULTATIVE

#### **16.SUBJECT OF STUDY : KNOWLEDGE AND COMMUNICATION**

**NUMBER OF CREDITS:** 3

**SEMESTER:** IV

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:** The course is addressed to the first year students and intent to present an introduction to human knowledge, as a concept and application tools in the real life: reading efficiently, writing correctly, intelligent searching information on the Internet; making different documents, etc.

**COURSE CONTENT:** A study-tour of communication; Internet and Web Searching; **FORUM:** Community Standards-General Rules; Efficient Reading; Writing Guidelines for Engineering and Science Students;

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written probe)

**BIBLIOGRAPHY:**

Susan Stellin : Resumes and Cover Letters; Burnes & Noble Publishing Inc., New York, 2004; ISBN: 0760737924;

Writing Guidelines for Engineering and Science Students; <http://owl.english.purdue.edu/internet/resources/genre.html>;

<http://www.usd.edu/trio/tut/excel/10.html>;

Microsoft EXCEL Links / Microsoft EXCEL Tips / EXCEL TUTORIAL ;

[http://www.exceltip.com/exceltips.php?view=excel\\_links](http://www.exceltip.com/exceltips.php?view=excel_links)  
Tara Kuther, Ph.D., About.com; Prepare Your Curriculum Vitae;

<http://gradschool.about.com/cs/curriculumvita/a/vitae.htm>  
PowerPoint 2002 (XP);

<http://www.gcflearnfree.org/computer/topic.aspx?id=82>

Happy Fun Communication Land; TUTORIAL: A STUDY-TOUR OF COMMUNICATION;

<http://www.rdiillman.com/HFCL/TUTOR/tutor0.html>

#### **17. SUBJECT OF STUDY: GENERAL PEDAGOGY**

**NUMBER OF CREDITS:** 4

**SEMESTER:** IV

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

**COURSE CONTENT:**

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY:**

#### **18. SUBJECT OF STUDY: SPORT III**

**NUMBER OF CREDITS:**

**SEMESTER:** III

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

Executarea corecta a exercitiilor de educatie fizica. Perfectionarea abilitatilor in jocurile de echipa.

**COURSE CONTENT:**

1. Dezvoltare fizică armonioasă - program de gimnastică aerobică (fete); - Joc bilateral: tenis de masă, baschet și fotbal

2. Alergare de viteză pe 30-50 m, cu start din diferite poziții; - Perfectionarea elementelor tehnice din volei: poziția fundamentală, pasa de sus cu două mâini, serviciul de jos cu o mână;

3. Dezvoltare fizică armonioasă - program de gimnastică aerobică (fete); - Joc bilateral: tenis de masă, baschet și fotbal;

4. Perfectionarea săriturii în lungime de pe loc; - Complex de dezvoltare a principalelor grupe musculare;

5. Dezvoltare fizică armonioasă - program de gimnastică aerobică (fete). - Joc bilateral: tenis de masă, baschet și fotbal

6. Verificare: Probe si norme de control.

**TEACHING LANGUAGE:**

**EVALUATION:**

**BIBLIOGRAPHY:**

#### **19. SUBJECT OF STUDY: SPORT IV**

**NUMBER OF CREDITS:**

**SEMESTER:** IV

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

Executarea corecta a exercitiilor de educatie fizica. Perfectionarea abilitatilor in jocurile de echipa.

**COURSE CONTENT:**

1. Perfectionarea alergării de rezistență; - Perfectionarea elementelor tehnice din volei: lovitura de atac, blocajul, serviciul de sus;

2. Dezvoltare fizică armonioasă - program de gimnastică aerobică (fete); - Joc bilateral: tenis de masă, baschet și fotbal;

3. Pregătirea probelor de control: alergare viteză - 50m, săritura în lungime de pe loc, alergare re rezistență; - Joc bilateral de volei;

4. Dezvoltare fizică armonioasă - program de gimnastică aerobică (fete); - Joc bilateral: tenis de masă, baschet și fotbal;

5. Verificare: Probe si norme de control: alergare viteză - 50m, săritura în lungime de pe loc, alergare re rezistență - 800m (f) și 1000m (b).

**TEACHING LANGUAGE:**

**EVALUATION:**

**BIBLIOGRAPHY:**

## ANUL III

### 1. SUBJECT OF STUDY : DIGITAL INTEGRATED CIRCUITS

**NUMBER OF CREDITS:** 4

**SEMESTER:** V

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** It is one of the domain disciplines in the study schedule. The aim of the course is the knowledge assimilation that students need in understanding the operation of the basic types of digital integrated circuits as well as the analysis and synthesis of logical combinational and sequential circuits methods.

The laboratory hours allow the consolidation of the theoretical notions and the achievement within the practice concerning digital circuits designing and using.

**COURSE CONTENT:** 1. Commutation drive for semiconductor devices; 2. Basic logical circuits; 3. Combinational logical circuits; 4. Sequential logical circuits

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written test)

**BIBLIOGRAPHY :**

- Filipescu, V., Circuite electronice digitale, Editura UNIVERSITARIA Craiova, 2002;
- Filipescu, V., Garaiman, D., Circuite electronice digitale – Indrumar de laborator, Reprografia Universitatii din Craiova, 1997;
- Maican, S., Sisteme numerice cu circuite integrate - culegere de probleme, Editura TEHNICA, Buc., 1980;
- Millman, J., Grabel, A., Microelectronique, McGraw-Hill, 1991;
- Stefan, Gh., Circuite integrate digitale, Editura DENIX, Bucuresti, 1993;
- Sztojanov, I., s.a., De la poarta TTL la microprocesor, Seria Electronica aplicata, Editura TEHNICA, Buc., 1987;
- Toacse, Gh., Nicula, D., Electronica digitala, Editura TEORA, 1996;
- Toacse, Gh., Nicula, D., Electronica digitala. Dispozitive – circuite – proiectare, Editura Tehnica, Bucuresti, 2005;
- Wakerly, J. F., Circuite digitale. Principiile si practicile folosite in proiectare, Editura Teora, Bucuresti, 2000.

### 2. SUBJECT OF STUDY : DATABASES

**NUMBER OF CREDITS:** 5

**SEMESTER:** V

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The course introduces fundamental topics in the field of databases: users, data models, entity-relationship model, relational model, relational algebra, file and index organization, distributed databases concepts. The labs consolidate the theoretical concepts and create working skills in MS Access 2000 and MS SQL Server 2000.

**COURSE CONTENT:** 1. Databases and Database Users; 2. Database System Concepts and Architecture; 3. Data Modelling Using the Entity-Relationship Model; 4. Record Storage and Primary File Organisation; 5. Index Structures for Files; 6. The Relational Data Model and Relational Algebra; 7. SQL - A Relational Database Language; 8. Distributed Databases

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written paper)

**BIBLIOGRAPHY:**

Fundamentals Of Database Systems , Ramez Elmasri, Shamkant B. Navathe, Addison-Wesley Publishing Company 1994

Principles of Database and Knowledge-Base Systems vol I, J.D. Ullman , Computer Science Press 1989

Baze de date, Burdescu D., Ionescu A., Stanescu L., Editura Universitaria, Craiova, 2004

Ghid pentru lucrari de laborator la baze de date, Ionescu A., Tipografia Universitatii din Craiova, 2004

### 3. SUBJECT OF STUDY : OPEARATING SYSTEMS

**NUMBER OF CREDITS:** 5

**SEMESTER:** V

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** It is one of the so called "disciplines in domain" from the curricula corresponding to this license domain. In the first Chapters one presents the primary notions and the classifications of operating systems along with the describing of the main architectural types. Afterward one introduces the most important concepts corresponding to the processes and threads management. Then one treats the problematic of memory management and of the most important aspects of the input-output operations. In the end one presents the fundamental notions corresponding to files' management. The laboratory is meant to help the understanding of knowledge on operating with Linux and on working with threads/processes and pipes in Linux. In the second part the students will study some aspects concerning the work with the memory manager, with the I/O system, with file systems and files and with the registry in Windows. At the seminar one toggles with the case studies Windows/Linux corresponding to the notions presented at the course classes.

**COURSE CONTENT:** 1. Primary notions; 2. Operating systems classification. Types of os; 3. Operating Systems' Architecture; 4. Notions about processes management; 5. Memory management ; 6. I/o devices management ; 7. Files management

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (final writing exams)

**BIBLIOGRAPHY:**

- Bovet, D., Cesati, M., Understanding the Linux kernel, 2-nd Ed., O'Reilly, 2003
- David S., Russinovich M., Andreas P., Windows Operating System Internals Resource Kit , 2006
- Johnson M., H., Win32 System Programming: A Windows® 2000 Application Developer's Guide, 2<sup>nd</sup> Edition, Addison-Wesley, 2000.
- Musatescu, C. , Sisteme de operare, Editura Radical, 1999
- Nicolae, I.D., Sisteme de operare, Tipografia Universitatii din Craiova, 2004
- Nicolae, I.D., Sisteme de operare I, Arhitecturi. Procese. Memorie. Dispozitive, Ed. Universitaria, 2007.
- Tanenbaum , A., Modern Operating Systems – Prentice Hall, 2001

### 4. SUBJECT OF STUDY : COMPUTER NETWORKS

**NUMBER OF CREDITS:** 5

**SEMESTER:** V

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The main goal of the course „Computer Networks” is to introduce the basic terminology and concepts in networking: these range from simple, limited streams of bits used to ferry data from a sender to a

receiver, to various schemes for identifying, addressing, routing, and handling messages as they travel across various types of networking media. Likewise, protocols also play a crucial role in data transmission across a network.

The laboratory activities give to the students the real feeling of the network applications.

**COURSE CONTENT:** 1. Data Communications; 2. Communications Networks; 3. Network Technologies; 4. Multiple Access; 5. Switching; 6. Naming and Addressing; 7. Routing; 8. Services and Applications; 9. Security

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written paper)

**BIBLIOGRAPHY:**

Marin Lungu – Retele de Calculatoare si Aplicatii, Editura Universitaria, 2002

Ed Tittel; Theory and Problems of Computer Networking; McGRAW-HILL, 2002

<http://www.packetizer.com>

<http://msdn.microsoft.com>

Berners-Lee, T., "WWW: Present, Past, and Future," IEEE Computer Magazine, October 1996, pp. 69—77.

Bradley Mitchell: "Introduction to VPN"; "Introduction to Hubs Part 1"; "The MAC Address An Introduction to MAC Addressing"; <http://compnetworking.about.com>

Cisco Systems; "Technology Brief Introduction to Gigabit Ethernet"

Chappell, D., "Understanding OLE and ActiveX", Microsoft Press, 1996.

Tim Donaldson: „A Comparative Analysis of High-Speed Switching for Backbone LANs: Fast Ethernet, FDDI, and Fibre Channel; Ancor Communications.

RFC2460: "Internet Protocol, Version 6 (IPv6) Specification"; December 1998

Lance Spitzner; "Configuring Network Interface Cards", August, 1999

<http://www.enteract.com/~lspitz/pubs.html>

Lantronix Tutorials- "Network SwitChing"; <http://www.lantronix.com/learning/tutorials/index.html>

Laura Cohen: "Understanding the World Wide Web"; University of Albany; <http://www.albany.edu/library/>

Lewis, T., "Where is Client/Server Software Headed," IEEE Computer Magazine, April 1995, pp. 49—55.

Hannerz, Ulf, 1980, Exploring the City. Inquiries Toward an Urban Anthropology, Columbia University Press, New York

Nicolau, Irina, Popescu, Ioana, 1999, O stradă oarecare din București, Editura Nemira, București

## 5. SUBJECT OF STUDY: DISTRIBUTED SYSTEMS

**NUMBER OF CREDITS:** 5

**SEMESTER:** V

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The aim of this course is to introduce students to the basic elements for creation of distributed applications in computer networks, with a special focus on the middleware layer in Internet-based distributed systems.

**COURSE CONTENT** 1. Distributed systems. Definitions and features; 2. Architectures, models and networks of distributed systems; 3. Concurrent programming. Threads; 4. Inter-process communication in distributed systems; 5. Communication protocols for distributed systems; 6. Name and directory services; 7. Object-oriented distributed systems and remote method invocation. Java RMI; 8. Agent-

oriented middleware. FIPA standards. Examples in JADE; 9. Service-oriented middleware. SOA and Web services; 10. Transactions and replication in distributed systems; 11. Distributed algorithms

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY:**

George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems. Concepts and Design, Addison-Wesley, 2001

Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2002

Sukumar Ghosh, Distributed Systems: An Algorithmic Approach, Chapman & Hall/CRC, 2007

Ajay D. Kshemkalyani, Mukesh Singhal: Distributed Computing: Principles, Algorithms, and Systems, Cambridge University Press, 2008

## 6. SUBJECT OF STUDY: MODELLING AND SIMULATION

**NOMBRE DE CRÉDITS:** 4

**SEMESTER:** V

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** 1. Introducing the basic concepts for modeling and discrete simulation; 2. Learning the analytical methods for modeling systems with waiting queues and networks of queues; 3. Introducing of techniques for the modeling, simulation and performances analysis at systems with complex discrete events; 4. Identification of possibilities and limits of mathematic models, their extension through simulation; 5. Using of packages and libraries of specialized programs for modeling and simulation; 6. Developing the abilities for the modeling/simulation of a system through exercises and problems, realization of a small project; 7. Students familiarization with the traditional and modern working practices; 8. Establishing of the required abilities directly related to other specialty disciplines.

**COURSE CONTENT:** 1. Introduction. Dynamic discrete systems (with events); 2. Systemic models for dynamic discrete systems (with events); 3. Operational models for dynamic discrete systems (with events); 4. Simulation of dynamic discrete systems (with events); 5. Specialized instruments (systems of programs) for discrete modeling and simulation

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written verification)

**BIBLIOGRAPHY :**

Banks J., Carson J.S., Nelson A., Nicol D., Discrete-Event System Simulation, 3rd Ed., Prentice-Hall, 2000

Cassandras C.G., Discrete Event Systems: Modeling and Performance Analysis, Irwin & Aksen, Boston, 1993

Lazowska E.D., Zahorjan J., Scott-Graham G., Sevcik K. C.: Quantitative System Performance - Computer System Analysis Using Queueing Network Models

Mocanu M., Principii, concepte și instrumente de modelare și simulare în studiul sistemelor dinamice discrete, Ed. Sitech, 2004

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Dodescu Gh., Simularea sistemelor, Ed. Militara, 1986

Radaceanu E., Limbaje de simulare, Ed. Militara, 1981

Mihoc Gh., Ciucu G., Introducere în teoria asteptării, Ed. Tehnica, 1967

Mihoc Gh., Ciucu G., Muja A., Modele matematice ale asteptării, Editura Academiei, Bucuresti, 1973

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- Misra J., Distributed Discrete-Event Simulation, ACM Computing Surveys, 18 (1), March 1986, pp. 39-65
- Zomaya A. (ed.), Parallel and Distributed Computing Handbook, McGraw-Hill, 1996
- Ho Y.C. (Ed.), Proceedings IEEE 77-1 (Special Issue on Dynamics of Discrete Event Systems), 1989
- Fujimoto R., Parallel Discrete Event Simulation, Comm.ACM, 33 (10), oct.1990, pp.31-53
- Ho Y.C., Cao X.R., Perturbation Analysis of Discrete Event Dynamic Systems, Kluwer Academic, 1991
- Nelson R.D., The Mathematics of Product Form Queueing Networks, ACM Computing Surveys, 25(3), 1993, pp.339-369

## 7. SUBJECT OF STUDY: PROJECT I – COMPUTER SYSTEMS

**NUMBER OF CREDITS: 2**

**SEMESTER: V**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** General objective of the discipline It follows the correct application of the theoretical knowledge acquired by the student in order to correctly design a computer system. Specific objectives Learning, by the student, of the main issues underlying the design of a computer system.

**COURSE CONTENT CONJUNCTION WITH EXPECTATIONS OF THE EPISTEMIC COMMUNITY REPRESENTATIVES, PROFESSIONAL ASSOCIATIONS AND EMPLOYEE REPRESENTATIVES IN THE PROGRAM DOMAIN**

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

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1. Ionescu Augustin-Iulian - Noțiuni de aritmetica a calculatoarelor, note de curs
  2. Ionescu Augustin-Iulian - Structura si organizarea calculatoarelor, note de curs
  3. Patterson David, Hennessy John - Computer Organization and Design, Morgan Kaufmann Publishers, 2004
  4. Cernian Oleg - Computer Architecture, Editura Sitech, Craiova, 2005
- Cernian Oleg - Computer Organization - Course support, Editura Sitech, Craiova, 2005

## 8. SUBJECT OF STUDY: PARALLEL AND DISTRIBUTED ALGORITHMS

**NOMBRE DE CRÉDITS: 4**

**SEMESTER: VI**

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** Basic objectives of this course include, but are not limited, to the following: 1. To introduce the basic models of parallel computing; 2. To enable the student to apply a systematic methodology for designing parallel algorithms; 3. To provide the student basic knowledge for the analysis of parallel algorithms; 4. To enable the student to efficiently use the parallel constructs of parallel programming languages.

**COURSE CONTENT:** 1. The Architecture of Parallel Systems; 2. Parallel Computing Models; 3. Brief Introduction

to Parallel Programming of Multiprocessors; 4. The General Theory of Parallel Algorithms; 5. Basic Numerical and Non-numerical Parallel Algorithms; 6. Parallel Languages

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written verification quizzes homework)

**BIBLIOGRAPHY :**

- [A] V. Kumar, A. Grama, A. Gupta, G. Kyrypis - Introduction to Parallel Computing Benjamin/Cummings 2003
- [A] R. W. Hockney, C.R. Jesshope , Parallel Computers - Architecture, Programming, Algorithms, Ed. Tehnica, Bucuresti, 1991
- [A] D. Grigoras – Parallel Computing. From Systems to Applications, Computer Libris Agora, 2000
- [A] M.Mocanu, Parallel Processing Algorithms and Languages (textbook, Reprografia Univ. Craiova, 1995)
- [A] M.Mocanu, A.Patriciu, Parallel computing in the C language on transputer-based systems, Unix and Windows NT networks (Reprografia Universitatii din Craiova, 1998)
- [B] Akl S., The Design and Analysis of Parallel Algorithms (Prentice-Hall, 1989)
- [B] Chaudhuri P., Parallel Algorithms Design and Analysis (Prentice-Hall, 1992)
- [B] JaJa J., An Introduction to Parallel Algorithms (Addison Wesley, 1992)
- [B] Christofer H.Nevison et al. - Laboratories for Parallel Computing, Jones and Bartlett, 1994
- [C] Galea D., Brudaru O., An Introduction to Systolic Computation (Ed. Academiei, Bucuresti, 1994)
- [C] Hoare C.A.R., Communicating Sequential Processes, Prentice-Hall 1985

## 9. SUBJECT OF STUDY: SOFTWARE ENGINEERING

**NOMBRE DE CRÉDITS: 4**

**SEMESTER: VI**

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The main objective of the course is to introduce students to the concepts and techniques required to build large software systems. The main objective for applications is to provide an opportunity to obtain practical experience applying the techniques on an actual development effort.

**COURSE CONTENT:** 1. Introduction to Software Engineering; 2. Requirements engineering; 3. Development of software systems; 4. Verification and validation of software systems; 5. Evolution of software systems

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam + homework)

**BIBLIOGRAPHY :**

- Ian Sommerville, Software Engineering, Addison Wesley, 6th Edition, 2001
- Roger Pressman, Software Engineering: a practitioner's approach, Addison Wesley, 5th Edition, 2001
- James F. Peters and Witold Pedrycz, Software Engineering: an engineering approach, John-Wiely, 2000

## 10. SUBJECT OF STUDY: WEB APPLICATION DESIGN

**NOMBRE DE CRÉDITS: 4**

**SEMESTER: VI**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The course covers aspects related to Web application architecture, Web application modelling, Web engineering, semantic and participative Web. The laboratory sessions and the project themes deal with Java-based Web technologies and frameworks.

**COURSE CONTENT:** 1. Introduction to Web applications' design; 2. Requirements engineering for Web applications; 3. Modelling Web applications; 4. Web application architectures; 5. Technologies for Web applications; 6. Testing Web applications; 7. Operation and maintenance of Web applications; 8. Web project management ; 9. The Web application development process; 10. Usability of Web applications; 11. Performance of Web application. 12. Security for Web applications; 13. Semantic Web; 14. Participative Web (Web 2.0)

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY :**

- Gerti Kappel, Birgit Pröll, Siegfried Reich, Werner Retschitzegger (Eds.): Web engineering: the discipline of systematic development of web applications. Wiley, 2006 (main textbook)
- Stefano Ceri, Piero Fraternali, Aldo Bongio, Marco Brambilla, Sara Comai, Maristella Matera: Designing Data-Intensive Web Applications. Morgan Kaufmann, 2002
- Cal Henderson: Building Scalable Web Sites. O'Reilly, 2006.
- Eric van der Vlist, Danny Ayers, Erik Bruchez, Joe Fawcett, Alessandro Vernet: Professional Web 2.0 Programming. Wrox Professional Series, 2006.
- Susan Fowler, Victor Stanwick: Web Application Design Handbook. Best Practices for Web-Based Software. Morgan Kaufmann, 2004.
- T. O'Reilly: What Is Web 2.0. Design Patterns and Business Models for the Next Generation of Software, 2005.
- Stefan Tanasa, Cristian Olaru: Dezvoltarea aplicatiilor Web folosind Java. Polirom, 2005.
- Sabin Buraga: Proiectarea siturilor Web. Design si functionalitate. Polirom, 2005.

#### 11. SUBJECT OF STUDY: DATA COMMUNICATION

**NUMBER OF CREDITS:** 4

**SEMESTER:** VI

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** It is one of the specialty disciplines. The course focuses on the introduction of basic concepts concerning data communication matters. One presents the communications environment, serial interfaces, and communication protocols at the level Data Link. The course presents the necessary basic skills for the upcoming courses of Computer Networks and Computer Networks Management. The laboratory is meant to consolidate the theoretical knowledge and to create abilities in what is concerning the serial interfaces programming through practical applications, exercises and problems.

**COURSE CONTENT:** 1. Distributed systems architecture; 2. Electrical interface; 3. Data transmission; 4. Communication protocols at the level at data link; 5. IEEE 802.3 CSMA/CD

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY:**

- Chow, W. (1983), Computer Communications, Vol. I: Principles, Prentice-Hall
- Cooper, E. (1986), Broadband Network Technology, Sytek-Prentice-Hall

Davies, D. W. and Barber, D.L.A. (1973), Communication Networks for Computers, Wiley

Halsall, F. (1988), Data Communications, Computer Networks and OSI, Addison Wesley

IEEE (1985), Logical Link Control – IEEE 802.2

Peebles, P. Z. (1987), Digital Communication Systems, Prentice-Hall

Peterson, W. W. (1961), Error Correcting Codes, MIT Press

Schwartz, M. (1987), Telecommunication Networks: Protocols, Modelling and Analysis, Addison-Wesley

Soloman, M. and Kramer, J. (1987), Distributed Systems and Computer Networks, Prentice-Hall

Stallings, W. (1985), Data and Computer Communications

#### 12. SUBJECT OF STUDY : MICROPROCESSORS DESIGN

**NUMBER OF CREDITS:** 4

**AN/SEMESTER:** VI

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The course develops the students' skills necessary to work with microprocessors and microcontrollers.

**COURSE CONTENT:** 1. VLSI Modules; 2. 8051 Microcontroller; 3. Dialog level; 4. Data transfer level

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (oral exam)

**BIBLIOGRAPHY :**

INTEL – Embedded Microcontrollers, Intel Corporation, 1998

INTEL – Microprocessors and Peripheral Handbook, vol 2, Peripheral, Intel Corporation, 1988

Mohamed Rafiqzaman - Microprocessor and Microcomputer Based System Design, CRC Press 1990

#### 13. SUBJECT OF STUDY: FORMAL LANGUAGES AND AUTOMATA

**NOMBRE DE CRÉDITS:** 4

**SEMESTER:** VI

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** The main objective of the course is to introduce the students the principles and the basic notions concerning formal languages and automata. The objective of applications is to enable the students to use the properties of regular languages and context-free languages in the area of computers.

**COURSE CONTENT:** 1. Abstract language representation  
2. Regular sets and right linear grammars; 3. Finite state automata; 4. Properties of finite state automata and regular sets; 5. Context-free languages ; 6. Push-down automata

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written exam + homework)

**BIBLIOGRAPHY :**

J.E. Hopcroft, J.D. Ullman, Introduction to Automata Theory, Languages and Computation, Addison-Wesley, 1979

A.V. Aho, J.D. Ullman, The Theory of Parsing, Translation, and Compiling, Prentice-Hall, 1972

T. Jucan, Limbaje formale si automate, Ed. MatrixRom, 1999

L.D. Șerbănați, Limbaje de programare și compilatoare, Editura Academiei, 1987

#### 14. SUBJECT OF STUDY: PROJECT II INFORMATION SYSTEMS

**NUMBER OF CREDITS:** 2

**SEMESTER:** VI

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** General objective of the discipline  
7.2 Specific objectives. Design and development of a stand-alone application in a multimedia environment

**COURSE CONTENT:** COURSE CONTENT CONJUNCTION WITH EXPECTATIONS OF THE EPISTEMIC COMMUNITY REPRESENTATIVES, PROFESSIONAL ASSOCIATIONS AND EMPLOYEE REPRESENTATIVES IN THE PROGRAM DOMAIN

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY:**

<http://software.ucv.ro/~cstoica/vpe.html>

<https://developer.android.com/training/basics/firstapp/index.html>

#### 15. SUBJECT OF STUDY: PRACTICAL STAGE

**NOMBRE DE CRÉDITS:** 4

**SEMESTER:** VI

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** *Design of the hardware, software and communication components. Solving problems using computer science and engineering tools.*

Design, life cycle management, integration and integrity of hardware, software and communication systems.

Identification, description and flow of processes in project management, by taking over of different roles in a team and a clear and concise, verbal and written, description of the results in the acting field. Proof of the spirit of initiative and action for updating professional, economic and organizational culture knowledge. General objective of the discipline - Practicing theoretical notions from past years. Specific objectives - Gaining experience with implementing a real world application.

**COURSE CONTENT:** 2 Practical activities (topics/homework)

I. Microcomputers - Network communication with arduino compatible microcomputers, Monitor and control using arduino devices , Self-configuration and proactiveness.

II. Mobile computing - Android applications, Network communications from an android device

III. Programming - Building distributed applications, Interaction protocols, Database design

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY :** 1.Thomas H. Cormen, Charles E.

Leiserson, Ronald L. Rivest and Clifford Stein, Introduction To Algorithms (3rd ed.), MIT Press, 2009

Coursera, a collection of the world's best courses

<https://www.coursera.org/>

Massachusetts Institute of Technology open courseware audio and video lectures <http://ocw.mit.edu/courses/audio-video-courses/>

Academic earth free online lectures and courses for computer science <http://academicearth.org/computer-science/>

Code School online courses

<https://www.codeschool.com/courses>

EdX online courses from the best universities

<https://www.edx.org/>

## DISCIPLINE FACULTATIVE

#### 16. SUBJECT OF STUDY: PEDAGOGY

**NUMBER OF CREDITS:** 4

**SEMESTER:** VI

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

**COURSE CONTENT:**

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY:**

#### 17. SUBJECT OF STUDY: ROBOTICS

**NUMBER OF CREDITS:** 4

**SEMESTER:** VI

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

**COURSE CONTENT:**

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY:**

#### 18. SUBJECT OF STUDY: CULTURE AND CIVILIZATION

**NUMBER OF CREDITS:** 2

**SEMESTER:** VI

**TYPE OF COURSE:** complementary

**COURSE OBJECTIVES:**

**COURSE CONTENT:**

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY:**

## ANUL IV

#### 1. SUBJECT OF STUDY : PROJECT MANAGEMENT

**NUMBER OF CREDITS:** 5

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** Introduction of notions from the „body of knowledge” corresponding to Projects Management; Understanding of the differences between „program” and „software program” notions; Presentation of the general concepts “team work” and “team building”: Acquiring of the required managerial knowledge: Introduction of ethic and professional themes in software engineering; familiarization with traditional and modern work practices; Establishing of the required abilities directly related to other specialty disciplines

**COURSE CONTENT:** 1. Software project. The general domain of projects management; 2. Software product (the program); 3. Software processes; 4. Project management within the general frame of software engineering; 5. Zones of knowledge and processes in the practice of managing software projects; 6. The management of project integration; 7. The management of project domain.; 8. Time management; 9. Costs management; 10. Projects quality management; 11. Human resources management; 12.

Communication management; 13. Management of material resources (purchasing); 14. Risk management in projects;

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam quizzes homeworks)

**BIBLIOGRAPHY:**

Guide to the Project Management Body of Knowledge, 2004 (PMBOK)

Cockburn, A., Surviving Object-Oriented Projects, Addison-Wesley, 1998.

Roberson, S. and Robertson, R., Managing Requirements, Addison-Wesley, 1999

Beck, K., Extreme Programming Explained, Addison-Wesley, 1999

Mocanu M., Managementul proiectelor (curs)

L. Landis, F. McGarry et al, Manager's Handbook for Software Development, Revision 1, SEL-84-101, November 1990

IEEE-CS Press, Guide to the Software Engineering Body of Knowledge, 1st version (1.00), A. Abran and J.W. Moore (ed.), 2001

Pfleger S.L., Software Engineering. Theory and Practice, Prentice Hall, 1998

Sommerville I., Software Engineering, 7th Ed., Pearson – Addison Wesley, 2004

Schach S.R., Object-Oriented and Classical Software Engineering, 6<sup>th</sup> Ed., McGraw Hill, 2006

Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides – Design Patterns: Elements of Reusable Object-Oriented Software, Addison Wesley, 1996

Sinan Si Alhir - Learning UML, O'Reilly, 2003

Tom Pender - UML Bible, John Wiley & Sons, 2003

Joseph Schmuller - Teach Yourself UML in 24 Hours, Sams Publ. 2004

## 2. SUBJECT OF STUDY: E-COMMERCE

**NOMBRE DE CRÉDITS:** 5

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The aim of this course is to introduce students to the basic elements for creation of e-commerce applications, including concepts, techniques, algorithms and technologies. The laboratory work concerns the experimentation with various e-commerce technologies and techniques that are needed for the development of a sample e-commerce application.

**COURSE CONTENT:** 1. Introduction to e-commerce; 2. Business models for e-commerce; 3. E-commerce infrastructure; 4. E-commerce marketing; 5. Security and payment; 6. Negotiation; 7. Trust and reputation; 8. Middle-agents; 9. Social networks; 10. Online content and media; 11. B2B e-commerce: supply chain and collaboration

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY :**

Kenneth C. Laudon, Carol Guercio Traver, E-Commerce: Business, Technology, Society, 4/e, Prentice Hall, 2008

Maria Fasli, Agent Technology for E-Commerce, Wiley, 2007

## 3. SUBJECT OF STUDY: DATA SECURITY

**NOMBRE DE CRÉDITS:** 4

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The course is meant to introduce the concepts of information security. The laboratory will give students the opportunity to practically improve their programming skills from a security point of view and also to apprehend the importance of security in internetworked environments.

**COURSE CONTENT:** 1. Introduction to information security; 2. Cryptographic tools; 3. Authentication; 4. Access control mechanisms; 5. Databases; 6. Intrusion detection; 7. Malicious software; 8. Denial of service; 9. Firewall and intrusion prevention systems; 10. Multilevel security; trust models; 11. Buffer overflow; 12. Physical and infrastructure security; 13. Security management and risk assessment; 14. Legal and ethical issues

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written test)

**BIBLIOGRAPHY :**

W. Stallings, L. Brown, "Computer Security: Principles and Practice", Prentice-Hall, 2008, ISBN-13: 9780136004240

W. Stallings, "Network Security Essentials: Applications and Standards", Prentice-Hall, 2007, ISBN-13: 9780132380331

B. Schneier, "Applied Cryptography: Protocols, Algorithms and Source Code in C", Wiley, 1996, ISBN-13: 978-0471117094

## 4. SUBJECT OF STUDY : DATABASE DESIGN

**NUMBER OF CREDITS:** 5

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The course introduces fundamental topics in the field of databases design: the enhanced entity-relationship model, EER-relational mapping, the theory of normalization and transactions processing concepts. The labs consolidate the theoretical concepts and create working skills in Oracle DBMS.

**COURSE CONTENT:** 1. Enhanced Entity-Relationship and Object Modelling; 2. ER- and EER-to-Relational Mapping; 3. Functional Dependencies and Normalization for Relational Databases; 4. Practical Database Design and Tuning; 5. Transaction Processing Concepts; 6. Concurrency Control Techniques; 7. Database Recovery Techniques; 8. Database Security and Authorization

**TEACHING LANGUAGE:** English

**FORMA DE EVALUATION:** Exam (written paper)

**BIBLIOGRAPHY:**

Fundamentals Of Database Systems , Ramez Elmasri, Shamkant B. Navathe, Addison-Wesley Publishing Company 1994

Principles of Database and Knowledge-Base Systems vol I, J.D. Ullman , Computer Science Press 1989

Baze de date, Burdescu D., Ionescu A., Stanescu L., Editura Universitaria, Craiova, 2004

Ghid pentru lucrari de laborator la baze de date, Ionescu A., Tipografia Universitatii din Craiova, 2004

## 5. SUBJECT OF STUDY: TRANSLATOR DESIGN

**NOMBRE DE CRÉDITS:** 5

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** (based on the specific learned competences)

7.1 General objective of the discipline To introduce students specific concepts and techniques on compilers and compiler design phases

7.2 Specific objectives

Understanding the principles and structure of compilers and translators

Understanding the techniques and methods for development of the main components of translators

The use of syntactic and lexical analysis methods to implement translators for small languages

**COURSE CONTENT:**

1. Introduction to Compilers (Compilers, Analysis of the source program, The phasis of a compiler)
2. Lexical analysis (The role of the lexical analyzer, Specification of tokens, Recognition of tokens, The Lex compiler)
3. Syntax analysis (The role of the parser, Top-down parsing, Bottom-up parsing, LR parsers, Parsers generators)
4. Syntax-directed translation (Syntax-directed translation, Constructions of syntax trees, S-attributed definitions, L-attributed definitions, Top-down translations, Bottom-up evaluation of inherited attributes)
5. Type checking (Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, Polymorphic functions)
6. Intermediate code generation (Three-Address Code, Types and Declarations, Translation of Expressions, Control Flow, Switch-Statement, Intermediate Code for Procedures)

**8.2 Practical activities (topics/homework)**

1. Compiler design methods and tools
2. Construction of a lexical analyser
3. Using Lex/Flex/Jflex
4. Construction of a descendent recursive parser
5. Using Yacc/Bison/JavaCup
6. Construction of a predictive syntax-directed translator
7. Syntax-directed translations using Yacc/Bison/JavaCup
8. Type checking
9. Intermediate code generation

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY :**

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman - Compilers: Principles, Techniques, and Tools, Addison- Wesley, 2007 (textbook).
2. Niklaus Wirth - Compiler Construction, Addison-Wesley, 1996.
3. Anthony A. Aaby - Compiler Construction using Flex and Bison (electronic free)

**6. SUBJECT OF STUDY: INFORMATION RETRIEVAL**

**NOMBRE DE CRÉDITS: 4**

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The general objective of Information retrieval course is to present a wide range of methods for locating needed information in different sets of data. This means searching for information in documents, searching for documents themselves, searching for metadata which describe documents. The efficiency of the search is the key issue. There are addressed problems

regarding query generation, query execution, data structures, indexing, employed algorithms and evaluation techniques.

**COURSE CONTENT:** 1. Introduction to informations storage and retrieval systems; 2. Introduction to data structures and algorithms related to information retrieval; 3. Inverted files; 4. Information retrieval using the Boolean model; 5. Index construction; 6. Modifications and enhancements to the basic indexing and search processes; 7. Vector space retrieval; 8: Evaluation in information retrieval

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written paper)

**BIBLIOGRAPHY :**

- Andoni, A., N. Immorlica, P. Indyk, and V. Mirrokni. 2007. Nearest Neighbor Methods in Learning and Vision: Theory and Practice. MIT Press
- Baeza-Yates, Ricardo, and Berthier Ribeiro-Neto. 1999. Modern Information Retrieval. Harlow: Addison-Wesley
- Bishop, Christopher M. 2006. Pattern Recognition and Machine Learning. Springer
- Cormen, Thomas H., Charles Eric Leiserson, and Ronald L. Rivest. 1990. Introduction to Algorithms. Cambridge MA: MIT Press
- Duda, Richard O., Peter E. Hart, and David G. Stork. 2000. Pattern Classification (2<sup>nd</sup> Edition). Wiley-Interscience
- Hastie, Trevor, Robert Tibshirani, and Jerome H. Friedman. 2001. The Elements of Statistical Learning: Data Mining, Inference, and Prediction. New York: Springer Verlag
- Korfhage, Robert R. 1997. Information Storage and Retrieval. Wiley
- Panos Pardalos James Abello and Mauricio Resende (eds.), 2002. Handbook of Massive Data Sets, chapter 2. Kluwer Academic Publishers.

**7. SUBJECT OF STUDY: PROJECT III INFORMATION TECHNOLOGY**

**NOMBRE DE CRÉDITS: 2**

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** (based on the specific learned competences

7.1 General objective of the discipline - The discipline contributes to the education and training of future computer engineers, specialists in the design and development of software systems, by providing fundamental knowledge in web information systems domain.

7.2 Specific objectives - By means of the project sessions, students acquire practical experience with respect to state-of-the-art web technologies and frameworks, as well as problem solving abilities. The following set of skills are targeted: analyzing requirements, defining specifications, designing, implementing, testing and managing the life cycle of a web information systems, as well as improving its performance. Team work is also encouraged, with students taking various roles and presenting the results in a clear and concise manner throughout the semester.

**COURSE CONTENT:** 8.1 COURSE (content units)

- 8.2 Practical activities (topics/homework)** Project theme selection and requirements analysis  
Web project management  
Web information systems modeling  
Web information system design and architecture  
Addressing security, scalability and performance issues

Web information system development  
Testing and improving the Web information system

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY :**

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel: Internet & World Wide Web - How to Program (5th edition). Prentice Hall, 2011.
2. Richard Fox: Information Technology: An Introduction for Today's Digital World, Chapman and Hall/CRC, 2013
3. Gerti Kappel, Birgit Proll, Siegfried Reich, Werner Retschitzegger (Eds.): Web engineering: the discipline of systematic development of web applications. Wiley, 2006.
4. Semmy Purewal: Learning Web App Development. Build Quickly with Proven JavaScript Techniques. O'Reilly Media, 2014.
5. R. Kelly Rainer, Brad Prince, Casey G. Cegielski: Introduction to Information Systems (5th Edition), Wiley, 2014.

#### **8. SUBJECT OF STUDY: COMPUTER NETWORKS MANAGEMENT**

**NOMBRE DE CRÉDITS: 4**

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** It is one of the specialty disciplines. The course focuses on the introduction of basic concepts concerning the management of computer networks. One presents the operation principles of a switch and of a router, the ISO-OSI model, the static routing, the dynamic routing algorithms. The course is ending a cycle of courses from this domain: Data Communications, Computer Networks and Computer Networks Management. The laboratory is meant to consolidate the theoretical knowledge and to create abilities in what is concerning the configuration and repairing computer networks through practical applications, exercises and problems.

**COURSE CONTENT:** 1. Introduction in computer networks management; 2. Bridging and Switching: fundamentals; 3. Routing: fundamentals; 4. Routing protocols

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written paper)

**BIBLIOGRAPHY :**

- Radia Perlman: Interconnections Bridges, Routers, Switches, and Internetworking Protocols
- Larry L. Peterson, Bruce S. Davie: Computer Networks A Systems Approach
- Christian Huitema: IPv6: The New Internet Protocol
- Craig Hunt: Networking Personal Computers with TCP/IP 5.
- John W. Stewart III: BGP4 Inter-Domain Routing in the Internet
- George Varghese: Network Algorithmics - An Interdisciplinary Approach to Designing Fast Networked Devices
- Gary R. Wright, W. Richard Stevens: TCP/IP Illustrated, Volume 2 The Implementation

#### **9. SUBJECT OF STUDY: VLSI CIRCUITS**

**NOMBRE DE CRÉDITS: 5**

**SEMESTER:** VII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** This course introduces the necessary concepts and tools of verification and then it

describes a process for planning and carrying out an effective functional verification of a design. It also introduces the concept of coverage models that can be used in a coverage driven verification process.

**COURSE CONTENT:** 1. What is verification? ; 2. Verifications tools; 3. The verification plan; 4. Architecting test benches

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam

**BIBLIOGRAPHY :**

- Bergeron J. – Writing Testbenches: Functional Verification of HDL Models, Second Edition, Kluwer Academic Publishers, 2003
- Bhasker J. – VHDL Primer, third edition, Prentice Hall, 1999
- Perry D. – VHDL Programming By Example, McGraw-Hill, 2002
- XILINX Corp. – VHDL Reference Guide
- XILINX Corp. – SPARTAN Family Reference Guide

#### **10. SUBJECT OF STUDY: COMPUTER SYSTEMS VERIFICATION AND TESTING**

**NUMBER OF CREDITS: 4**

**SEMESTER:** VII

**TYPE OF COURSE:** domain

**COURSE OBJECTIVES:** (based on the specific learned competences)

7.1 General objective of the discipline - We try to introduce the systematic knowledge on testing objectives, quality metrics, methods and testing techniques for the software programs.

7.2 Specific objectives - Design of the test cases used in testing the computer systems.

**COURSE CONTENT:**

**8.1 COURSE (content units)**

Principles of Software Testing  
Quality Characteristics System  
Software Testing Techniques  
Static Testing  
Black-Box Testing  
White-Box Testing  
Test cases Management

**8.2 Practical activities (topics/homework)**

Metrics for Quality Characteristics System  
Empiric Testing  
Systematic Testing  
Static Testing  
Black-Box Testing  
White-Box Testing

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification ( written paper)

**BIBLIOGRAPHY:**

1. Ion Ivan, Panagiotis Siniros, Mihai Popescu, Felix Simion - Metrici Software, Infocrec, ISBN 973-97435-0-X, Bucuresti 1997
2. Kaner, Cem; Falk, Jack; Nguyen, Hung Quoc - Testing Computer Software, John Wiley & Sons, ISBN: 0-471-35846-0, New York 1999
3. Rex Black - Managing the testing Process - 2nd Edition, John Wiley Publishing, Inc., 2002
4. Jeff Tian - Software Quality Engineering ; Testing, Quality Assurance, and Quantifiable Improvement - John Wiley & Sons, Inc., 2005
5. Glenford J. Myers The Art of Software Testing - 2nd Edition John Wiley & Sons, Inc., 2005.

6. Andreas Spillner, Tilo Linz, Hans Schaefer - Software Testing Foundations - 2nd Edition rockynook, 2007  
Ion Ivan, Panagiotis Siniros, Mihai Popescu, Felix Simion - Metrici Software, Infocrec, ISBN 973-97435-0-X, Bucuresti 1997

1. Ilene Burnstein - Practical Software Testing, Springer-Verlag New York, Inc., 2003,  
Hiromi Oshima, Noboru Okino, Yasuhiro Kawata - Memory Testing Method and Memory Testing Apparatus, US2001/0052093, Dec. 13, 2001

#### **11. SUBJECT OF STUDY: PROJECT IV MICROCOMPUTERS**

**NOMBRE DE CRÉDITS: 2**

**SEMESTER: VII**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:**

7.1 General objective of the discipline

The introduction of the basic knowledge on analysis and synthesis of microcomputers so that students acquire practical knowledge for achievement and programming of the microcomputer.

7.2 Specific objectives

Using intelligent systems.

**COURSE CONTENT:**

**8.2 Practical activities (topics/homework)**

**Project:**

Implementing a complex system using RaspberryPi, Arduino, LEDs, LCD and various types of sensors.

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY :**

1. Banzi, M, Getting started with Arduino, O'Reilly, 2009
2. Tom Igoe, Making Things Talk: Using Sensors, Networks, and Arduino to see, hear, and feel your world, Published September 2011, O'Reilly
3. Karvinen, K, Make Arduino bots and gadgets, 2011, O'Reilly
4. Matt Richardson and Shawn Wallace: "Getting Started with Raspberry Pi", O'Reilly, December 2012
5. "Bootting the Raspberry Pi for the first time", Rasperry Pi HQ, 21 September 2014
6. Benchoff, Brian: "64 Rasberry Pis turned into a supercomputer", Hackaday, 30 March 2014
7. Ozolins, Jason: "examples of Rasperry Pi composite output", RasperryPi.org, 22 June 2012
8. Pritchard, Stephen: "Rasperry Pi: A BBC Micro for today's generation", *ITPRO*, 15 March 2012.

#### **12. SUBJECT OF STUDY: PRACTICAL STAGE FOR LICENSE PROJECT COMPLETION**

**NOMBRE DE CRÉDITS: 6**

**SEMESTER: VII**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:**

**COURSE CONTENT:**

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification

**BIBLIOGRAPHY :**

#### **13. SUBJECT OF STUDY: MOBILE COMPUTING**

**NOMBRE DE CRÉDITS: 5**

**SEMESTER: VIII**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:**

7.1 The overall objective of discipline - Contribute to training future engineers in the field of computers , specialists in designing and developing mobile applications , providing them with knowledge of mobile applications design and practical use of mobile devices , architectures and software development models . They deal with basic concepts used in the design and implementation of mobile applications .

7.2 Specific objectives

Introduction to principles , architectures and best practices specific to the design of mobile applications . Using libraries for mobile applications to demonstrate their benefits compared to current software industry-specific criteria , productivity , performance, reusability and maintenance. The laboratory aims to fix theoretical knowledge and understanding of the concepts taught to enable the development of practical applications.

**COURSE CONTENT:**

**8.1 Course (content units)**

1. Introduction to mobile technologies . The structure of a mobile device. Applications of mobile computing
2. Arhitectura mobile applications and design elements . native Apps
3. Development Environments . Introduction to Objective- C
4. Designing templates and model - view-controller delegated applied to mobile devices
5. development environments for mobile applications . Limited computing resources
6. Memory management . Fault tolerance and persistence developed applications for mobile devices
7. Security Strategy
8. Wireless Communication Technologies . Cellular networks
9. TCP / IP for mobile technologies . Geo- location and global positioning system
10. Graphical interfaces for mobile devices
11. Mobile Computing distributed
12. Ad hoc networks and mobile devices and sensors
13. Study future technologies for mobile devices
14. The convergence of mobile device communication

**8.2 Activities applied ( topics / themes)**

1. Introduction to mobile technologies . The structure of a mobile device. Applications of mobile computing
2. Arhitectura mobile applications and design elements . native Apps
3. Development Environments . Introduction to Objective- C
4. Designing templates and model - view-controller delegated applied to mobile devices
5. Development environments for mobile applications . Limited computing resources
6. Memory management . Fault tolerance and persistence developed applications for mobile devices
7. Security Strategy
8. Wireless Communication Technologies . Cellular networks
9. TCP / IP for mobile technologies . Geo- location and global positioning system
10. Graphical interfaces for mobile devices
11. Mobile Computing distributed
12. Ad hoc networks and mobile devices and sensor
13. study future technologies for mobile devices
14. The convergence of mobile device communication

**TEACHING LANGUAGE:** English

**EVALUATION:**Written final exam Written intermediate exam

## BIBLIOGRAPHY:

1. Sumi Helal, 2004, The Landscape of Pervasive Computing Standards, Synthesis Lectures on Mobile and Pervasive Computing, ISBN 9781598299267
2. B'Far Reza, 2004, Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, ISBN 0-521-81733-1
3. Poslad Stefan, 2009, Ubiquitous Computing: Smart Devices, Environments and Interactions, ISBN 0-470-03560-9
4. Talukder Asoke, Yavagal Roopa, 2006, Mobile Computing: Technology, Applications, and Service Creation, ISBN 007-147733-0.

## 14. SUBJECT OF STUDY: MACHINE LEARNING

**NOMBRE DE CRÉDITS:** 5

**SEMESTER:** VIII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:**

7.1 General objective of the discipline - The course objective is to explore the construction and study of algorithms that can learn from and make predictions on data.

7.2 Specific objectives - This course includes the following topics: Supervised learning algorithms (support vector machines, neural networks, association rules); Unsupervised learning algorithms (clustering, dimensionality reduction, recommender systems).

**COURSE CONTENT:**

8.1 COURSE (content units)

1. Introductory elements
2. Linear regression
3. Logistic regression
4. Supervised learning. Unsupervised Learning
5. Association rules learning
6. Decision tree learning
7. Artificial neural networks representation and learning
8. Unsupervised learning. Clustering
9. Support vector machine
10. Bayesian networks
11. Genetic algorithms

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (final writing exams)

**BIBLIOGRAPHY :**

C. M. Bishop, Pattern Recognition and Machine Learning. Springer. ISBN 0-387-31073-8, 2006.

Wernick, Yang, Brankov, Yourganov and Strother, Machine Learning in Medical Imaging, IEEE Signal Processing Magazine, vol. 27, no. 4, July 2010, pp. 25-38

Mannila, Heikki, Data mining: machine learning, statistics, and databases. Int'l Conf. Scientific and Statistical Database Management. IEEE Computer Society, 1996.

Friedman, Jerome H. ,Data Mining and Statistics: What's the connection?, Computing Science and Statistics 29 (1): 3-9, 1998.

Mitchell, T. , Machine Learning, McGraw Hill. ISBN 0-07-042807-7, 1997

Russell, Stuart, Norvig, Peter , Artificial Intelligence: A Modern Approach (2nd ed.). Prentice Hall. ISBN 978-0137903955, 2003.

Anca Loredana Ion, Stefan Udristoiu, *Image Mining for Establishing Medical Diagnosis*, Information Technology and Control, Kaunas, Technologija, 2010, ISSN 1392-124X, Vol. 39, No. 2, 123 - 129.

Anca Loredana Ion, *Methods for Knowledge Discovery in*

*Images*, Information Technology and Control, ISSN 1392-124X, Vol. 38, No.1, 2009, pp. 43-49.

Anca Udristoiu, Stefan Udristoiu, and Elvira Popescu, Predicting Students' Results Using Rough Sets Theory, *Intelligent Data Engineering and Automated Learning-IDEAL 2014*, pp. 336-343, Springer International Publishing, 2014

Anca Loredana Ion, Rough Sets and Gaussian Mixture Model in Medical Image Diagnosis, Annals of the University of Craiova - Mathematics and Computer Science Series, ISSN 1223-6934, Craiova, Romania, Vol. 38, Nr. 4, December 2011, pg. 50-62

Anca Loredana Udristoiu, *Metode pentru Diagnosticarea Automată, Asistată de Calculator a Imaginilor Medicale*, ISBN 978-606-11-3213-3, SITECH, CRAIOVA, MARTIE 2013, nr. pag.186

Anca Loredana Ion, *Image Annotation Based on Semantic Rules*, Advances in Soft Computing, Human-Computer Systems Interaction, Springer-Verlag, ISSN 1615-3871, vol. 60, 2009, pp.83-97.

Laboratory platforms in electronic format

C. M. Bishop, Pattern Recognition and Machine Learning. Springer. ISBN 0-387-31073-8, 2006

Anca Loredana Ion, *Methods for Knowledge Discovery in Images*, Information Technology and Control, ISSN 1392-124X, Vol. 38, No.1, 2009, pp. 43-49

Anca Loredana Ion, Rough Sets and Gaussian Mixture Model in Medical Image Diagnosis, Annals of the University of Craiova - Mathematics and Computer Science Series, ISSN 1223-6934, Craiova, Romania, Vol. 38, Nr. 4, December 2011, pg. 50-62

Anca Loredana Udristoiu, *Metode pentru Diagnosticarea Automată, Asistată de Calculator a Imaginilor Medicale*, ISBN 978-606-11-3213-3, SITECH, CRAIOVA, MARTIE 2013, nr. pag.186

Tutorial on machine learning algorithms:

<http://homepages.inf.ed.ac.uk/rbf/IAPR/researchers/MLPAGES/mltut.htm>

## 15. SUBJECT OF STUDY: GRAPHICAL SYSTEMS

**NOMBRE DE CRÉDITS:** 5

**SEMESTER:** VIII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The course wishes to introduce the concept of graphic processing system. General concepts and exemplifications, the widely used graphic processing libraries – OpenGL and DirectX are presented. The laboratory has the role of improving the studied information and of implementing them in C++ using DirectX libraries.

**COURSE CONTENT:** 1. Direct 3D Rendering Chain; 2. Drawing in Direct 3D; 3. Colours; 4. Lights; 5. Textures; 6. Blending; 7. Meshes

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written test)

**BIBLIOGRAPHY :**

Frank D. Luna - Introduction to 3D Game Programming with DirectX 9.0 - Wordware Publishing, Inc., Plano - Texas, 2003

Tomas Möller, and Eric Haines. Real-Time Rendering. 2nd ed. Natick, Mass.: A K Peters, Ltd., 2002.

Wendy Jones - An Introduction to 3D Computer Graphics - Course Technology PTR, 2004  
Kelly Murdock – 3ds Max Bible 9 – Wiley, 2007.  
Dave Shreiner, Mason Woo, Jackie Neider, Tom Davis - OpenGL(R) Programming Guide: The Official Guide to Learning OpenGL(R), 5th edition, Addison-Wesley Professional, 2005.

## 16. SUBJECT OF STUDY: MULTIMEDIA SYSTEMS

**NOMBRE DE CRÉDITS: 5**

**SEMESTER:** VIII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The course introduces basic concepts in multimedia field: multimedia technologies, multimedia data types (image, sound, video), compression algorithms, specific methods for multimedia data querying and two important multimedia applications: for e-learning and on multimedia databases. The lab presents the working way in some very popular authoring tools (Flash, Fireworks). During the labs and with homeworks the students must design and implement multimedia applications that combine all multimedia data types using the presented authoring tools.

**COURSE CONTENT:** 1. Introduction; 2. Multimedia Authoring; 3. Multimedia technologies; 4. Sound 5. Video; 6. Images; 7. Compression methods; 8. Content-based visual query; 9. Applications on multimedia databases; 10. Multimedia applications of e-learning type

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written paper)

**BIBLIOGRAPHY :**

Multimedia Systems Concepts Standards and Practice, Ramesh Yerraballi,

<http://data.uta.edu/~ramesh/book/MultimediaSystems/index.html>

Baze de date multimedia-studiu asupra unor metode de regasire a informatiei vizuale, Liana Stanescu, Ed. Universitaria 2004

Networked Multimedia Systems, S.V. Raghavan, Satish K. Tripathi, Pearson Education Ltd., 1997

Multimedia Systems and Content-Based Retrieval, Sagarmay Deb, Idea Group Publishing, 2004

Multimedia Applications, Ralf Steinmetz, Klara Nahrstedt, Springer, 2004

Macromedia Flash 5, Phillip Kerman, Ed. Teora 2004

## 17. SUBJECT OF STUDY: HUMAN – COMPUTER INTERACTION

**NOMBRE DE CRÉDITS: 4**

**SEMESTER:** VIII

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:**

7.1 General objective of the discipline - The discipline contributes to the education and training of future computer engineers, specialists in the design and development of software systems, by providing fundamental knowledge in human-computer interaction area (analysis, modeling, design, implementation and evaluation of human-computer interfaces).

7.2 Specific objectives - The course aims to introduce core concepts regarding human-computer interaction: models, theories, techniques and tools for interaction, design methodologies for human-computer interfaces, usability

issues, evaluation techniques, performance improvement methods. Topics related to intelligent interfaces (based on user model, natural and multimodal interaction) are also addressed. By means of the lab sessions, students acquire practical experience with respect to state-of-the-art languages and tools for creating user interfaces, as well as problem solving abilities. The following set of skills are targeted: analyzing requirements, creating use cases, building prototypes, implementing user interfaces, applying evaluation techniques for interface usability.

**COURSE CONTENT:**

### 8.1 COURSE (content units)

Introductory concepts for human-computer interaction

Interaction models, theories, techniques and tools

Human-computer interaction styles

Physiological and psychological characteristics in HCI.

Affective and emotional factors

Design methodologies for human-computer interfaces.

Design patterns

Languages and tools for building user interfaces

Interface usability. Qualitative and quantitative evaluation techniques

Data visualization interfaces

Interfaces for collaborative work and social interaction

Emerging interaction techniques and communication

approaches

Natural and multimodal interaction

### 8.2 Practical activities (topics/homework)

Introductory concepts, requirements analysis for the chosen application

User modeling, roles and stereotypes (*personae*)

Generating use cases (*storyboarding*)

Building paper mockups

Building low fidelity prototypes (*wireframing*)

Building high fidelity prototypes

User interface implementation

Interface evaluation and usability testing

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written exam)

**BIBLIOGRAPHY :**

Jeff Johnson: Designing with the Mind in Mind (2nd edition). Morgan Kaufmann, 2014

Scott Murray: Interactive Data Visualization for the Web. O'Reilly, 2013

Dan Norman: The Design of Everyday Things: Revised and Expanded Edition. Basic Books, 2013

Yvonne Rogers, Helen Sharp, Jenny Preece: Interaction Design: Beyond Human Computer Interaction (3rd edition). Wiley, 2011

Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs: Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th edition). Prentice Hall, 2010

Dan R. Olsen Jr.: Building Interactive Systems. Course Technology, 2010

Dan Saffer: Microinteractions: Designing with Details. O'Reilly, 2013

Jenifer Tidwell: Designing Interfaces (2nd edition). O'Reilly, 2011

\*\*\*, Design Handbook,

<http://wiki.fluidproject.org/display/fluid/Design+Handbook>, 2011

\*\*\*, Research-Based Web Design & Usability Guidelines,

[http://www.usability.gov/sites/default/files/documents/guidelines\\_book.pdf](http://www.usability.gov/sites/default/files/documents/guidelines_book.pdf), 2014.

## 18. SUBJECT OF STUDY: EMBEDDED SYSTEMS

**NOMBRE DE CRÉDITS: 5**

**SEMESTER: VIII**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The primary goal of this course is to meet the student with basic information for the design and software development for embedded systems. At the conclusion of the course and laboratory, the student will have the knowledge and skills necessary to develop software for embedded systems, using technical specifications as well as specific methods of design and programming languages.

**COURSE CONTENT:** 1. Introduction; 2. Specifications ES; 3. Embedded Operating Systems, Middleware and Scheduling

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written paper)

**BIBLIOGRAPHY :**

Marwedel, P., Embedded System Design, Kluwer Academic Publishers, textbook

Marwedel, P., Embedded System Design, Univ Dortmund (<http://ls12www.cs.uni-dortmund.de/%7Eemarwedel/kluwer-es-book/slides.html>)

Grosu, M., Systeme de calcul timp-real - note de curs, an IV C/CE

<http://www.agilemodeling.com>

## 19. SUBJECT OF STUDY: DIGITAL SIGNAL PROCESSING

**NOMBRE DE CRÉDITS: 5**

**SEMESTER: VIII**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:**

7.1 General objective of the discipline - Design of the hardware, software and communication components specific to digital signal processing area

7.2 Specific objectives - The discipline wants to introduce fundamental concepts related to the architecture of the signal processors, implementing of the algorithms for signal processing on DSP systems, using of the computing equipment with DSP in communications.

**COURSE CONTENT:**

8.1 COURSE (content units)

Cap. 1. Digital signal processing; 1.1. Algorithms for DSP; 1.2. Architectures for DSP; 1.4. DSP's range of applications; 1.5. Characteristics of digital signal processing:

programmability, stability, repeatability

Cap. 2. Filtering; 2.1. RC filters, CR filters; 2.2. Types of filters; filter performance criteria; 2.3. Finite Impulse

Response filters; 2.4. Infinite Impulse Response filters; 2.5. Realization of digital filters; 2.6. Comparison of FIR and IIR filters; 2.7. Noise in filter designs

Cap. 3. Transforming signals into the frequency domain; 3.1. The phasor model; 3.2. Modelling sinusoids; 3.3. Fourier series; 3.4. Discrete Fourier series; 3.5. Nonperiodic signals - the Fourier transforms; 3.6. The discret Fourier transformation; 3.7. Fast Fourier transformation

Cap. 4. Encoding of Waveforms; 4.1. Analog waveform coding; 4.2. Digital waveform coding-Pulse Coded Modulation; 4.3. Delta Modulation; 4.4. Vocoders; 4.5. Windowing; 4.6. Channel vocoder; 4.7. Linear Predictive Coding

Cap.5. Design of DSP systems; 5.1. Hardware alternatives for DSP; 5.2. Fixed- point DSP devices; 5.3. Floating-point DSP devices; 5.4. DSP system speed considerations; 5.5. Accessing memory resources; 5.6. Integration of peripheral devices

8.2 Practical activities (topics/homework)

1. OMAP 5912 Starter Kit Presentation

2. CCS4 configuration and utilization

3. Support library and first program

4. Sine Wave Generation

5. Musical Notes Generation

6. Numerical Filters

7. Serial Communication

8. Ethernet Communication

9. Audio Signals Processing

**TEACHING LANGUAGE:** English

**EVALUATION:** Exam (written exam)

**BIBLIOGRAPHY :**

1. C. Marvin, G. Ewers - A simple approach to digital signal processing, John Willey & Sons, Inc. 1996

2. R. Chassaing, D. Horning - Digital signal processing with the TMS320C25, John Willey & Sons, Inc. 1990

3. I. Ahmed - Digital control applications with the TMS320 family, Texas Instruments, Dallas, 1991

4. \*\*\* TMS320C5x DSK Applications Guide, Texas Instruments Europe, 1997

5.\*\*\* Code Composer Studio v4.0 User's Guide

## 20. SUBJECT OF STUDY: SENSOR NETWORKS

**NOMBRE DE CRÉDITS: 5**

**SEMESTER: VIII**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:**

7.1 General objective of the discipline

Design of the hardware, software and communication components specific to sensors networks

7.2 Specific objectives

The discipline wants to introduce fundamental concepts related different types of sensors and their network interconnections, with applications in automotive, industry and domestic.

**COURSE CONTENT:**

**8.1 COURSE (content units)**

Cap. 1. General presentation. Sensors types: inductive, capacitive, optics, for humidity, intelligent

Cap. 2. Networks and technologies for data acquisition. Ad-hoc networks. Sensors networks. Standards and platforms for wireless networks

Cap. 3. Standards and integrated networks for automotive: LIN, SENT

Cap. 4. Standards and integrated networks for domestic and industrial applications: RFID, NFC, ZigBee, Bluetooth, Wi-Fi

Cap.5. Wireless monitoring of human health. Wireless applications in environment surveillance

**8.2 Practical activities (topics/homework)**

1. Presentation of communication protocols LIN and SENT

2. Programming of LED RGB modules with LIN interface

3. Programming of temperature sensor with SENT interface

4. ZigBee communication protocol presentation

5. Programming of temperature sensor with ZigBee protocol

6. Bluetooth 4.0 communication protocol presentation

7. Programming of a mouse device with Bluetooth protocol

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written verification)

**BIBLIOGRAPHY :**

1. Callaway, E. H. - Wireless Sensor Networks: Architectures

and Protocols, CRC Press, August 2003

2. Cooklev, T. - Wireless Communication Standards: A Study of IEEE 802.11, 802.15, and 802.16, Standards Information Network/ IEEE Press, August 2004

3. Ilyas, H., Mahgoub, I. - Handbook of Sensor Networks: Compact Wireless and Wired Sensing Systems, CRC Press, July 2004

4. Li, Xiang-Yang - Wireless Ad Hoc and Sensor Networks, Cambridge University Press, June 2008

## **21. SUBJECT OF STUDY: REAL TIME COMPUTER SYSTEMS**

**NOMBRE DE CRÉDITS: 4**

**SEMESTER: VIII**

**TYPE OF COURSE:** specialization

**COURSE OBJECTIVES:** The primary goal of this course is to meet the student with basics of real-time systems hardware structure, real-time I/O devices programming, real-time operating systems and task scheduling algorithms. At the conclusion of this course, laboratory and project, the student will have the knowledge and skills necessary to develop software for Real-Time Data Acquisition and Control Systems, using a general purpose PC 104 embedded system and real-time kernels / operating systems.

**COURSE CONTENT:** 1. Introduction to Real-Time Systems Examples of RTCS, Definitions and classifications, Elements of a RT Computer Control System, Classification of RTCS, Classification of programs; 2. RTCS for Process Control Systems Categories of processes, Computers activities related to RTCS for processes control, Structures of computer systems for real-time processes control; 3. Computer hardware requirements for RTCS General hardware structure, Input/output signals from/to real world, Functional blocks of a Data Acquisition and Control System; 4. Programming the I/O devices in real-time applications Communicating methods with external devices, Programming using hardware interrupts, Counter/Timer devices, An example of Data Acquisition and Control System; 5. Real-time operating multi-tasking systems Introduction, Task management in real-time applications, A case study: RTOS QNX ; 6. Scheduling algorithms for Hard Real Time Systems Introduction, Rate-Monotonic Scheduling Algorithm, Preemptive Earliest Deadline First Algorithm, A case study: A mixed RM-EDF scheduling algorithm; 7. Real-time data communication Introduction, Real-time data communication protocols, Deadline based protocols.

**TEACHING LANGUAGE:** English

**EVALUATION:** Verification (written verification)

**BIBLIOGRAPHY :**

Grosu, M.: Course notes – basic text

Cooling, J.E.: Real-time software Systems – An introduction to structured and OO design, PWS Publishing Company, 1998.

Krishna, C.M., K.G. Shin: Real Time Systems, McGraw-Hill Book CO., 1997.

Stuart, B.: Real Time Computer Control, 1988

Tannenbau, A. S.: Modern Operating Systems, Prentice-Hall, 1993.