Field of Study: Environment Engineering

Programme of studies: Enginereeng and environment protection in industry

First year of study:

Subject of study: Mathematical Analysis

CODE: D24IPMSL101
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 1st year/1st semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students basic theoretical and practical concepts related to the differential and integral study of functions of several variables and their applications. It allows the necessary practical skills and techniques associated to the differential and integral calculus.
CONTENT: Sequences and series of real numbers. Power series. Taylor series. Functions of several variables (limits and continuity, differentiation, partial derivatives). Extrema for functions of several variables. Multiple integrals (double and triple). Elements of vector calculus.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):

Grecu L., Analiză matematică pentru ingineri, Ed. Universitaria Craiova, 2008
Pătrăşcoiu C. Grecu L., Bordeaşu I., Matematici aplicate în tehnică, Ed. Politehnica, Timişoara 2003
Grecu L., Probleme rezolvate de analiză matematică, Editura TipoRadical, Dr. Tr. Severin, 2006
F. Creţ, Rujescu C., Capitole speciale de analiză matematică și geometrie analitică, Ed. Mirton, Timişoara, 1999.
Cristescu R., Matematici generale, Ed. Didactică şi Pedagogică, Bucureşti 1967
Nicolescu M. Dinculeanu N. Marcus S., Analiză matematică, Ed. Didactică şi Pedagogică, 1966
Rădescu N., etc. Matematici speciale aplicate în economie –culegere de probleme, Reprografia Universităţii din Craiova, 1991.
Mihnea G., Matematici aplicate, Ed. Universității Bucuresti, 2000.

Subject of study: Chemistry

CODE: D24IPMSL102
NUMBER OF CREDITS: **3**
YEAR/SEMESTER: 1nd year/1nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: The development knowledge in the field of chemistry, close by practice and the relationship with the environment, contributes to technical formation of the students but also achieve a clear image of the phenomena taking place in the technological processes
CONTENT: Correlation between chemical structure and some properties of substances. Thermodinamic and chemical kinetics notions. Electrochemistry and electrochemical energy conversion. Corrosion and corrosion protection. Fuels and lubricants. Macromolecular compounds.
TEACHING LANGUAGE: Romanian
EVALUATION: Written examination
BIBLIOGRAPHY (selective):

Ghermec, O., Chimie aplicată în inginerie, Editura Universitaria, Craiova, 2010,
Oancea, D., Podina, C., Oancea, A.M., Chimie. Principii şi Aplicaţii, Editura ALL,Bucureşti, 1998.
Ghermec, O., Chimie aplicată în inginerie, Tipografia Universităţii din Craiova, 2006

Subject of study: Physics

CODE: D24IPMSL103
NUMBER OF CREDITS: 4
YEAR/SEMESTER: First year / first semester
TYPE OF COURSE: fundamental
OBJECTIVES: Discipline "Physics" aims to familiarize students with the main physical phenomena from mechanical elements, covering chapters such as where atomic and nuclear physics. This knowledge, provided students are required to understand and manufacturing processes as well as operational activities and equipment repair. Moreover, the knowledge gained may allow improvement of technological processes.
CONTENT: The kinematics material point, Newtonian mechanical principles, theorems and conservation laws in the dynamics of material point, Oscillations. Sizes characteristic oscillations. Propagation of oscillations. Where .. Wave interference. Diffraction of waves. Dispersion. Doppler effect, temperature. Temperature measurement. Amount of heat, heat capacity, specific heat, Principle I of thermodynamics. Second principle of thermodynamics. Entropy, thermal machines ideal. Electrostatic interaction of electric charges. Electric field. Coulomb force. Flow tubing. Gauss's theorem. . Working electric field. Electric potential of point load. Electrical potential gradient. Equipotential surfaces. General characterization of the magnetic field. Magnetic field flow. Movement of loads in electric and magnetic field. Lorentz force. Features ferro-magnetic substances, dia-and paramagnetic, electromagnetic waves, quantum physics elements, getting physical solid, crystalline structure. Classification. Modern applications of physics
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral
BIBLIOGRAPHY (selective):

George, C., Moisil , Fizica pentru ingineri, Editura Tehnică, 1980
Traian Creţu. Fizică generală, vol.1, vol.2, Editura Tehnică, 1984-1986
Demian Gabriela, s.a. Fizica. Indrumator de laborator, Editura Universitaria Craiova 2006
D. Halliday, R. Resnick: Fizica, vol. I si II. Editura Did. si Pedag, Bucuresti (1975).
R R.P. Feynmann, R. B. Leighton, M. Sands: Fizica modernă, Vol. I-III. Edit.Tehn. Bucuresti (1970).

Subject of study: Programming computers and programming languages I

CODE: D24IPMSL104
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 1st year/ 1st semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students the basic computer terminology and concepts, a knowledge of the fundamental operating system functions, the theoretical and practical concepts of the Microsoft Office software applications as well as the Internet access and electronic communication.
CONTENT: Fundamentals of Computer. Operating Computer using GUI based Operating System. Microsoft Office application: MS Word, Excel, Access, PowerPoint. Internet access and electronic communication.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Brookshear J.G., Introducere în Informatica, Editura Teora, Bucuresti, 1998.
Coman D., Bazele utilizării calculatoarelor, Note de curs, 2010.
Coman D., Baze de date - ACCESS, Îndrumar de laborator, Reprografia Universităţii din Craiova, 2004.
Nortin Peter, John Goodman, PC - Totul despre calculatoare personale, Editura Teora, 2001
Petrescu A., Iacob Fr., Racovița Z., Inițiere în structura calculatoarelor electronice, Editura Teora,Bucuresti, 1996.
Prodan, F. Gorunescu, M. Gorunescu, Excel, Access si pagini Web, Ed. Albastră – Microinformatica, Cluj-Napoca, 2006.

Subject of study: Programming computers and programming languages II

CODE: D24IPMSL210
NUMBER OF CREDITS: 3
YEAR/SEMESTER: 1st year/ 2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students the basic concepts of programming languages, the description of algorithms, flowchart and pseudocode, basic concepts of C/C++ language and programming, a knowledge of data structures, functions and structured programming.
CONTENT: Basic concepts of programming languages. Algorithms. Description of alghoritms through flowchart and pseudocode. C++ language structures. Variables. Constants. Operators. Basic Input/Output. Data Structures. Functions and Arguments. Arrays. Pointers. Implementation of user-defined functions.

TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Coman D., Bazele utilizării calculatoarelor, Note de curs, 2010.
Donald K., Arta programarii calculatoarelor, vol I "Algoritmi fundamentali", Editura Teora,Bucuresti, 1999.
Kernighan B., Ritchie D., The C Programming Language, Prentice Hall, 1988.
Jamsa K., Klander L., Manualul fundamental de programare în C și C++, Editura Teora, 1997
Patrut B., "Aplicatii in C si C++", Editura TEORA, 2003.
Pârv B., Vancea Al., Fundamentele limbajelor de programare, Editura Albastra, Cluj-Napoca, 1996.
Somnea D., Turturea D., Initiere in C++, Ed. Tehnica, Bucuresti 1993.
Tudor Sorin, Bazele programarii in C++, Ed. L&S, Bucuresti, 1995.

Subject of study: Linear Algebra, Analytical and Differential Geometry

CODE: D24IPMSL212
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 1st year/ 1st semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students basic theoretical and practical concepts of linear algebra, analytical and differential geometry and their applications. It allows the necessary practical skills used in the study and understanding of other disciplines, and in engineering problem solving.
CONTENT: Vector spaces. Vector coordinates. Linear transformations. Eigenvectors and eigenvalues. Bilinear and quadratic forms. Euclidean spaces. Orthonormal basis. Conics and quadrics. Straight lines and planes in the Euclidean space. Differential geometry of curves and surfaces.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Vladimirescu I., Grecu L., Algebra liniara, geometrie analitica si diferentiala, EUC, 2007.
Vladimirescu I., Popescu M., Algebră liniară şi geometrie analitică, EUC, 1994
Vraciu G., Algebră liniară, Reprografia Univ. Craiova, 1994
C. Pătrăşcoiu, Algebră liniară, geometrie analitică și diferențială, EUC, 2005
Udrişte C., Algebră, geometrie analitică şi diferenţială, EDP, Bucureşti, 1984

Subject of study: Descriptive geometry and technical drawing

CODE: D24IPMSL105 + D24IPMSL211
NUMBER OF CREDITS: 3 + 3
YEAR/SEMESTER: 1st year/1st and 2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: Knowledge of basic concepts and reasonings on the implementation of solid geometry relationships in vertical projection systems. Knowledge representation methods in two-dimensional space of elementary geometric elements such as point, line, plane or surface. Knowledge and use of the methods for determining the actual size of the specified geometric elements. Understanding how to make detail drawings and drawings.
CONTENT: Representation of point and line in the triple vertical projection Representation plan. Methods of transformation of the figures. Assembly drawing. Assembly. Representation and dimensioning of machinery parts. Tolerances and fits. Applying the skills of working with drawing tools at the level of descriptive geometry

TEACHING LANGUAGE: Romanian
EVALUATION: Written examination
BIBLIOGRAPHY (selective):
Ghermec, C, Geometrie descriptivă şi desen tehnic, Note de curs
Popescu, T., ş.a., Geometrie descriptivă , Tipografia Universităţii din Craiova, 2005

Subject of study: Linear Algebra, Analytical and Differential Geometry

CODE: D24IPMSL212
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 1st year/2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students basic theoretical and practical concepts of linear algebra, analytical and differential geometry and their applications. It allows the necessary practical skills used in the study and understanding of other disciplines, and in engineering problem solving.
CONTENT: Vector spaces. Vector coordinates. Linear transformations. Eigenvectors and eigenvalues. Bilinear and quadratic forms. Euclidean spaces. Orthonormal basis. Conics and quadrics. Straight lines and planes in the Euclidean space. Differential geometry of curves and surfaces.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Vladimirescu I., Grecu L., Algebra liniara, geometrie analitica si diferentiala, EUC, 2007.
Vladimirescu I., Popescu M., Algebră liniară şi geometrie analitică, EUC, 1994
Vraciu G., Algebră liniară, Reprografia Univ. Craiova, 1994
C. Pătrăşcoiu, Algebră liniară, geometrie analitică si diferentială, EUC, 2005
Udrişte C., Algebră, geometrie analitică şi diferenţială, EDP, Bucureşti, 1984

Subject of study: Materials science

CODE: D24IPMSL213
NUMBER OF CREDITS: 3
YEAR/SEMESTER: 1st year/2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students theoretical and practical concepts on the chemical bonds, materials structures and properties related to the solidification, plastic deformation and heat treatment processes.
CONTENT: Chemical bonds. Ideal and real crystallin lattices. Plastic deformation mechanisms. Crystalization and solidification phenomena. Accompaning processes of the solidification phenomena. Alloy systems theory. Fe-C alloys. Fe-based solidification structures. Non-ferrous alloys. Basis on heat treatments of ferrous and non-ferrous alloys. Heat treatment structures of ferrous and non-ferrous alloys. Basis on composites and nanomaterials.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Gingu, O., Sima, G., Stefan, I., Studiul materialelor – note de curs, Reprografia Universitatii din Craiova, 2011
Gingu, O., Materiale compozite usoare, Ed. Universitaria, Craiova, 2003
Mangra, M., Materiale fabricate prin metalurgia pulberilor, Editura Universitaria Craiova, 1997, ISBN -973-9271-17-0
Mangra, M., Stiinta Materialelor. Curs, Reprografia Universitatii din Craiova, 1994
Colan, H., Studiul Materialelor, Ed. Dacia, Cluj-Napoca, 1988

Subject of study: Mechanics

CODE: D24IPMSL214
NUMBER OF CREDITS: 4
YEAR/SEMESTER: First year/2nd semester
TYPE OF COURSE: specialized
OBJECTIVES: The course offers the students theoretical concepts to substantiate all disciplines with mechanical character. This discipline represents the starting point for the study of phenomena that occur in the activity of the engineer, including basic scientific concepts of its activity.
CONTENT: Statics of material point. Statics of rigid (particular systems of forces, geometry masses, moments of inertia). Kinematics of material point (basic concepts, study material point movement in different coordinate systems). Kinematics of rigid (general movement of rigid, particular movement of rigid). Dynamics of material point (basic concepts, general theorems, differential equations of movement of material point). Elements of mechanical vibration (items of kinematics vibration, items of dynamic vibration).
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Sima, G., Mecanica si vibratii mecanice, Editura Universitaria, Craiova, 2009
Roşca, I., Seminar de mecanică, Ed.Matrix Rom., Bucureşti, 2001
Buculei M., Marin, M., Elemente de mecanică tehnică (teorie şi aplicaţii) Ed. Universitaria, Craiova 1994
Hegedus, A., Drăgulescu, D., Probleme de mecanică, dinamică, Ed. Helicon, Timişoara 1993

Subject of study: Materials technology

CODE: D24IPMSL215
NUMBER OF CREDITS: 3
YEAR/SEMESTER: First year / 2nd semester
TYPE OF COURSE: domain
OBJECTIVES: Discipline "Materials technology" aims to familiarize students with the main ways of obtaining metallic materials and their equilibrium diagrams and the main methods of processing materials. Emphasis is placed on acquiring key technologies, phenomena and processes which matter through to become a finished product. This knowledge, provided to the students are required to understand the manufacturing processes and as well the activities of exploitation and repair the

equipment. Moreover, the knowledge gained may allow improvement of technological processes.
The main objective is the acquisition of the method to obtain a particular product.
CONTENT: Purpose and importance of technology materials, metal materials, classification and properties, primary development, Cast iron. Developing cast iron, steels. Develop steel, non-ferrous materials. Ferrous materials development, secondary development, casting metals, Physical basis of casting, casting methods, processing methods by plastic deformation of metallic materials, hot and cold plastic deformation, erosion processing; powder aggregation processing, permanent joints; welding, soldering joints, Cutting, metal, Protection of metallic materials against corrosion, control of non-metallic materials
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral
BIBLIOGRAPHY (selective):
Aurel Nanu – Tehnologia Materialelor – Editura Didactică şi pedagogică 1983
Mihai Demian - Tehnologia Materialelor, Indrumar de laborator —- Editura Universitaria 2009
Sever Şontea - Tehnologia Materialelor - Craiova 1980
Vasile Popovici - Tehnologia Materialelor - Editura Politehnica 1985
M. Demian, C. Gârniceanu - "Materiale şi tehnologii primare" Ed. Scrisul Românesc 2002

Subject of study: English language I + II

CODE: D24IPMSL108 + D24 IPMSL 216
NUMBER OF CREDITS: 3 + 3
YEAR/SEMESTER: 1st year/1nd + 2nd semester
TYPE OF COURSE: domain
OBJECTIVES: The course is designed to help students understand English words and paragraph and that is very important to understand English language
- Knowledge the necessary notions in English language for machine mechanisms and machinery;
CONTENT: 1. An introduction into Engineering Materials Technology (Production phase, usage, recycling), Present Simple and Continuous
The braking system in power cars (how brakes work, the concept of green brakes, ecological materials for brakes), describing events with Past Simple and Continuous
Composite technology (definition, applications, making a speech), Present Perfect vs. Past Simple, role-play
High voltage cables (description, materials, uses), means of expressing the Future
Describing properties of materials (using adverbs of manner), noun formation, vocabulary (describing tools, properties, uses), role-play
Describing components and assemblies (plugs and sockets), presenting advantages and disadvantages
Manufacturing techniques (drilling, flame-cutting, milling, sawing, shearing)
Describing position of assembled components (cluster ballooning), prepositions for describing position, The Passive Voice, Engineering design-working with drawings (plan, cross-section, exploded view, elevation, schematic, specification), describing details Inventions: the incandescent lamp, present and past tenses revision
Working with complex numbers, mathematical operations, fractions, Greek and Latin numeric prefixes**TEACHING**
Characteristics of Materials, Some Phrases for Academic Writing Property, Some Phrases for Describing Figures, Diagrams and for Reading Formulas, Grammar: Comparison, Processing and Performance, Classification of Materials, Grammar: Verbs, Adjectives, and Nouns followed by Prepositions
Metals, Introduction .Mechanical Properties of Metals, Important Properties for Manufacturing
Metal Alloys.Case Study, Ceramics, Structure of Ceramics, Word Formation: Suffixes in Verbs, Nouns and Adjectives Properties of Ceramics, Case Study: Optical Fibers versus Copper Cables, Grammar: Adverbs II
Polymers, Word Formation: The Suffix -able/-ible, Properties of Polymers
Case Study: Common Objects Made of Polymers Grammar: Reported Speech (Indirect Speech) Polymer Processing
Composites, Case Study: Snow Ski, Grammar: Gerund (-ing Form)
Case Study: Carbon Fiber Reinforced Polymer (CFRP)
Word Formation: Prefixes, Advanced Materials, Semiconductors, Case Study: Integrated Circuits
Advanced Materials, Smart Materials, Nanotechnology, Case Study: Carbon Nanotubes, Grammar: Modal Auxiliaries
Technical Writing , Punctuation and capitalization, Making corrections and improvements on written drafts
Being concise, Writing style - creating a warm, professional tone, Text abbreviations, Short words for emails and text messages, Identifying parts, Engine part vocabulary
LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
1.Vince, M, Advanced Language Practice; Macmillan Publishers, 2003;
2. Universitatea Politehnică din Bucureşti,ICPE, CNR-CEI, Dicţionarul Terminologiei Electrotehnice Standardizate (Român-Englez, Englez-Român), Editura tehnică, Bucureşti 1996
3. Williams, Ivor, English for Science and Engineering, Thomson ELT, Edwards Brothers, 2007
4.Bălăcescu, Ioana, English for Geographers with Environmental Speciality, Craiova:Editura Universitaria,2009
5. Eisenbach, Iris,English for Materials Science and Engineering , Vieweg+Teubner ,2011
6. Williams, Ivor, English for Science and Engineering, Thomson ELT, Edwards Brothers, 2007

Subject of study: Physical education and Sport I + II

CODE: D24IPMSL109 + D24IPMSL216
NUMBER OF CREDITS: 1+ 1
YEAR/SEMESTER: 1st year/1nd + 2nd semester
TYPE OF COURSE: complementary

OBJECTIVES: the course is intended for students in order to preserve their health, increase their resistance to effort, harmonious physical development and create some sporting skills.
CONTENT: 1.-Running with changing tempo after 50m. and then 100-150m (3/4.2 / 4.4 / 4.2 / 4).
-Conduction of the ball (repeat); depriving the opponent of the ball (learning) - football.
2. -Processing an application hall of the hall with climbing, climbing, jumping, transport of weights.
-Service - pick-up - pass (complex of procedures) passes from the top, bottom in 2 and 3 players (volleyball)
3. - Initial testing through room tests
-Mark, demarcation in relation 1-1 free on the whole ground (basketball)
4. -Dribling, walking - repeating items in different variants (basketball); playing 5x5 with focus on tracking balls at the board.
5. Attack crash - learning the impulse, beat, jump, landing (volleyball); a two-way game with an emphasis on performing the service and attack strike in different areas.
6. -Dropping the ball in dribbling - learning; 5x5 game with emphasis on this technical process.
Taking the ball out of work - repeating with emphasis on excessive leg flexion. Bilateral game with emphasis on taking two hands down.
TEACHING LANGUAGE: Romanian
EVALUATION: sports tests
BIBLIOGRAPHY (selective):
Mangra, G.I., - Tenis de masă, Editura Universitaria Craiova, cod 130 CNCSIS, ISBN 978-606-510-170-8, 2008.
Lică, E.M., Mangra, G.I., - Tenis de masă - iniţiere în tehnica jocului, Editura Universitaria Craiova, cod 130 CNCSIS, ISBN 973-742-443-3 ISBN 978-973-742-443-3, 2006.
Mangra, G.I., - Exerciţii şi jocuri dinamice, Editura Universitaria Craiova, cod 130 CNCSIS, ISBN 973-742-009-8, 2005.
Mangra, G.I., - Managementul sportului, Editura Universitaria Craiova, cod 130 CNCSIS, ISBN 973-8043-592-2, 2004.
Mangra, G.I., Popa, G.M., Gheţu, R.B., - Exerciţii şi jocuri motrice pentru şcolari, Editura Universitaria Craiova, cod 130 CNCSIS, ISBN 973-8043-432-2, 2004.
Burcea, G., Orţănescu, C., Burcea, R., Mangra, G.I., - Handbal - Elemente de teorie şi metodică, Universitatea din Craiova, Facultatea de Educaţie Fizică şi Sport, Curs editat în Reprografia Universităţii din Craiova, 1999.

Subject of study:
Technical drawing and infographics

CODE: D24IPMSL320
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 2nd year/1nd semester
TYPE OF COURSE: domain
OBJECTIVES:
The course is designed to help students understand the importance of Technical drawing and infographics
- Knowledge in the representation of machine mechanisms and machinery;
CONTENT: Releasable assembly. Assemblies with feathers. Threaded assemblies.Non-demountable assemblies.Welded assemblies. Classification. Welding mark.Gears and transmissions. Gears with gears. Chain transmissions. Belt transmissions.Bearings. Bearings for sliding. Rolling Bearings. Representation. Designation.Surface quality and tolerances. Signs of quality of processed surfaces. Tolerances and adjustments. Drawing the conventional quality signs and tolerances and adjustments on the drawing.Execution of the technical drawing. Formats used. Execution of the technical drawing on a scale. Drawing of the sub-assembly and the whole.Technical documentation. Drawing up the operation drawing. Drawing up the datasheet
TEACHING LANGUAGE: Romanian
EVALUATION: Written examination
BIBLIOGRAPHY (selective):
1. R. Păunescu, Desen tehnic și infografică , Universitatea din Brasov,
2. C-tin Dale, Th. Nițulescu, P. Precupețu, Desen tehnic industrial pentru construcții de mașini, Editura Tehnică București 1990
3. Al. Ene, Desen tehnic industrial, Editura Avrămeanca, Craiova,1993
4. Al. Ene, Desen geometric, Craiova, 1992
5. Traian Popescu s.a., Desenul tehnic de la schita la ansamblu, Editura Universitaria Craiova, 2006
6. *** STAS desen tehnic Seria U10

Second year of study:

Subject of study:
Special mathematics

CODE: D24IPMSL321
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 2tnyear/1st semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students basic theoretical and practical concepts regarding Special mathematics, the most important numerical techniques and their applications in solving problems, and the implementations of algorithms in numerical calculus programms.
CONTENT: Special mathematics, Basic concepts(numerical versus analytical methods, errors). Numerical methods for linear systems of equations. Numerical methods in matriceal calculus. Method of succesive approximations and applications. Methods for solving nonlinear equations and systems. Approximation of functions. Numerical integration. Numerical solutions of ODE.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Grecu Luminita, Metode numerice cu aplicatii in C/C++, Editura Universitaria 2009
Valeriu Iorga, Boris Jora, Metode Numerice, Editura Albastra, 2008

Adela Ionescu, Mihai Costescu, Luminiţa Grecu, - Elemente de calcul numeric. Modele computaţionale, Editura Universitaria Craiova, 2005.
Dincă Al., Ebâncă D., Ţăndăreanu N.-Calcul numeric şi aplicaţii, Universitatea din Craiova,1985.
Ebâncă D.- Metode de calcul numeric, Ed. SITECH, Craiova , 1994.
Postolache M. Metode nemerice, Ed.Sirius, Bucureşti 1994
Ghinea M., Fireteanu V., MATLAB - calcul numeric, grafica, aplicatii, Teora, 1999
Curteanu S., Initiere in MATLAB, Ed. Polirom, 2008.

Subject of study: Numerical Methods

CODE: D24IPMSL429
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 2tnyear/2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students basic theoretical and practical concepts regarding the most important numerical techniques and their applications in solving problems, and the implementations of algorithms in numerical calculus programms.
CONTENT: Basic concepts(numerical versus analytical methods, errors). Numerical methods for linear systems of equations. Numerical methods in matriceal calculus. Method of succesive approximations and applications. Methods for solving nonlinear equations and systems. Approximation of functions. Numerical integration. Numerical solutions of ODE.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):

Grecu Luminita, Metode numerice cu aplicatii in C/C++, Editura Universitaria 2009
Valeriu Iorga, Boris Jora, Metode Numerice, Editura Albastra, 2008
Adela Ionescu, Mihai Costescu, Luminiţa Grecu, - Elemente de calcul numeric. Modele computaţionale, Editura Universitaria Craiova, 2005.
Dincă Al., Ebâncă D., Ţăndăreanu N.-Calcul numeric şi aplicaţii, Universitatea din Craiova,1985.
Ebâncă D.- Metode de calcul numeric, Ed. SITECH, Craiova , 1994.
Postolache M. Metode nemerice, Ed.Sirius, Bucureşti 1994
Ghinea M., Fireteanu V., MATLAB - calcul numeric, grafica, aplicatii, Teora, 1999
Curteanu S., Initiere in MATLAB

Subject of study: Basics of Computer Aided Design

CODE: D24IPMSL322 + D24IPMSL430
NUMBER OF CREDITS: 3 + 3
YEAR/SEMESTER: 2 year/1st and 2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: Basics of the computer aided design – 2D drawing and 3D modeling using surface and solid features. Ability to developed engineering CAD drafts from 3D computer models. Parametric design concepts, assembling, associative drafting development, basic engineering design concepts. Numerous exercises from laboratory classes will develop to students, strong abilities for using SolidWorks package.
CONTENT: The role of a CAD system in the production cycle. Analytic representation of curves and surfaces used in CAD system. Modeling elements: layers, colors, line types. Wireframes modeling, entities selection, copy, move, editing features. Drafting, tolerances, formats, sections, views, hatching. 3D modeling using surfaces, primitives, revolution, extrusion, sweeping, lofting, blend, offset, filet and corners operations on solids. Solids editing, sketching features and concepts, profile, path 2D/3D cutting, splitting, design using features as holes, drafts, fillets, shells, sweeps, ribs, chamfers. Parametric modeling using relations and Excel sheets. Assembling, degrees of freedom, components table, interference checking.
TEACHING LANGUAGE: Romanian
EVALUATION: Computer examination.
BIBLIOGRAPHY (selective):

Bazele proiectării asistate de calculator, Note de curs, Roşca A., Reprografia Universităţii, 2001
Viviana FILIP, Cornel MARIN, Lucian GRUIONU, Alexis NEGREA, Proiectarea, modelarea, simularea sistemelor mecanice, utilizând SolidWorks, CosmosMotion şi CosmosWorks, Valahia University Press, Târgovişte, 2008.
Proiectarea în plan cu Autocad R12, Roşca A. ş.a., CERTI 1995
Proiectare asistată, Mazilu D., Note ce curs, Reprografia Universităţii, 1999
*** Documentaţia de firmă SolidWorks.

Subject of study: Strength of Materials I + II

CODE: D24IPMSL323 + D24IPMSL431
NUMBER OF CREDITS: 4+3
YEAR/SEMESTER: 2nd year / 1st+ 2ndsemester
TYPE OF COURSE: Domain
OBJECTIVES:
Dissemination of information regarding the main aspects of the mechanical resistance of materials is the main objective. Offering to the students the methods of analysis and calculation specific to the mechanical resistance of materials is objective as well.
CONTENT:
1. Generalities
2. Stresses in transversal sections of bars
3. Tensile and compression
4. Conventional calculation in shear of bars
5. General stress and strain status
6. Applications

1. Static momentum, momentum and inertia radius. Resistance Modulus. Variation of the inertial momentum.
2. Twisting of circular bars
3. Bending of bars. Definitions. Clasifications of the bending loadings
4. Stress diagrams, N, T,Mi. Conventions of signs. Normal and tangential stress in bended bars.
5. Strain of bended bars

TEACHING LANGUAGE: Romanian
EVALUATION: Written examination
BIBLIOGRAPHY (selective):

Savu, I.D. – Mechanical Resistance of Materials – Course notes

Deutsch, I. – Mechanical Resistance of Materials, Ed. Didactică şi Pedagogică, Bucuresti, 1979
Cernăianu, E., Tarniţă, D. – Mechanical Resistance of Materials, Reprografia Universităţii din Craiova, 1995
Babeu, T. - Mechanical Resistance of Materials, Litografia UTT, Timişoara, 1991
Cristuinea, C. - Mechanical Resistance of Materials, Litografia IPTVT, Timişoara, 1981

Subject of study: Thermotechnics

CODE: D24IPMSL325 + D24IPMSL432
NUMBER OF CREDITS: 3 + 3
YEAR/SEMESTER: 2nd year/1st and 2nd semester
TYPE OF COURSE: domain
OBJECTIVES: The course offers the students theoretical and practical concepts of the thermodynamics of the heating processes
CONTENT: Fundamentals: thermodynamic system, state, state parameters and functions, equation, state equations, mechanical work, heat, internal energy, entalpy. Thermodynamic properties of the pure substances. Phases, parts, homogenous and heterogenous system. P-V-T surface. P-V, V-T, P-T diagrams. Clausis-Clapeyron equation. Specific heats. Thermal analysis of the ideal and real gases. Themodynamic fundamentals of the burning processes. Fuels. Reaction heat. Material balance of the burning process. I-T diagram.
TEACHING LANGUAGE: Romanian
EVALUATION: Written
BIBLIOGRAPHY (selective):
Nicolescu, s.a. – Apps in thermotechnics and thermal machines, SDP Publishing House, Bucharest, 1962.
Bică M., Călbureanu M., Cernăianu C., Gabriela Demian-Heat transfer, ICMET Publishing House, Craiova 2003, ISBN 973-86650-0-0
Savu, S – Course notes

Subject of study: Electromagnetic engineering and electrical machines

CODE: D24IPMSL326 + D24IPMSL433
NUMBER OF CREDITS: 3+3
YEAR/SEMESTER: 2nd year/ 1st and 2nd semester
TYPE OF COURSE: domain
OBJECTIVES: The course offers to students theoretical and practical concepts regarding electromagnetic phenomena, electric circuits analysis, construction and operating of electrical machines.
CONTENT: Electric and magnetic status. Interdependence of electrical and magnetic parameters. (General laws. Magnetic circuit law, Faraday ' s law, a.s.o.). Electrostatic field, potential difference, voltage. Static electriokinetic regime. DC electrical circuits. Electrical circuits in variable regime.
Electrical circuits in permanent sinusoidal periodic regime.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Şora C. - Bazele electrotehnicii, Editura didactică şi pedagogică, Bucureşti, 1982
Nicula Al., Cristea Gh., Simon S. - Electricitate şi magnetism, Editura didactică şi pedagogică, Bucureşti, 1982
Priboi M. - Electrotehnică, Editura Sitech, Craiova, 2001
Răduleţ R. - Bazele electrotehnicii. Probleme. Vol.I+II, Editura didactică şi pedagogică, Bucureşti, 1970
Bălă C. – Maşini electrice, Editura Didactică şi Pedagogică., Bucureşti 1982
Câmpeanu A. – Maşini electrice. Probleme fundamentale, speciale şi de funcţionare optimă, Editura Scrisul Românesc, Craiova 1988

Subject of study: Radiation source and technical protection

CODE: D24IPMSL434
NUMBER OF CREDITS: 5
YEAR/SEMESTER:3nd year/ first semester
TYPE OF COURSE: of the domain
OBJECTIVES: The aim of the course is the specialist to know: Detection and measurement of radiation flow counters, scintillation, fissile material detectors (detectors used in reactor adjustment) Measures to be taken in case of nuclear accident (removal of the causes that lead to radiation above the permitted maximum). During the formative point of view and their main goal formation lucrarile basic knowledge in the field of dosimetry for those working in the nuclear field. Also know how to work with modern measuring devices and laboratory equipment to perform measurements that relate to basic dosimetric quantities.
CONTENT: Natural radioactivity. The life of radioactive elements. Radioactive dating. Nuclear radiation sources. Sources of charged particles. Radioactive isotopes as sources of nuclear radiation. Absorbed dose and absorbed dose rate (appropriate units). Exposure. External exposure - dose calculation for different sources sources. Mitigating primary radiation and secondary radiation accumulation. Corpuscular radiation interaction with matter. Spontaneous fission as a source of neutrons. Nuclear reactors. Detecting and measuring radioactive radiation. Types of dosimeters. Individual dosimeters. History isotopes and their applications. Effects of ionizing radiation, radioactive pollution of the environment and protection of radioactive waste. Radioactive waste management, radiation protection
TEACHING LANGUAGE: Romanian
EVALUATION: Written
BIBLIOGRAPHY (selective):
George I. Ionescu , Lectii de fizica. Radiatii Ionizante , 1995

Subject of study: Environment protection

CODE:
NUMBER OF CREDITS: 3
YEAR/SEMESTER: 1st year/1nd semester
TYPE OF COURSE: domain
OBJECTIVES: The course aims to present the basic concepts of environmental protection. The discipline contributes to the development of competences in the field of environmental

engineering, knowledge and application of environmental concepts in the formation of students.
Knowledge of environmental pollution characteristics
Knowledge of the immediate and long-term effects of environmental pollution and degradation processes and of protection and consistency measures.
CONTENT: Environment protection. Basic concepts.
Protection of the atmosphere.
Soil protection.
Water protection.
Environmental pollution due to waste disposal
LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
1. Criveanu M.C., PROTECTIA MEDIULUI – Note de curs
2.Gavrilescu E.; Buzatu G-D, ELEMENTE FUNDAMENTALE DE PROTECTIA MEDIULUI, Ed SITECH, 2014
3.Gavrilescu E.; Buzatu G-D, METODE DE DEPOLUARE A M.I., Ed SITECH, 2010
4.Ozun A., Teodosiu C., PREVENIREA POLUARII MEDIULUI, Ed.Univ. Transilvania, 2002
5.Rojanschi V. et all, PROTECTIA SI INGINERIA MEDIULUI, Ed.Economica, 2002

Third year of study:

Subject of study: CAE (Computer Aided Engineering) Integrated Systems

CODE: D24IPMSL540
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 3rd year/1st semester
TYPE OF COURSE: fundamental
OBJECTIVES: This course cover principles of design, analysis and computer simulation in engineering. Starting with advanced CAD knowledge of product shape design, finite elements method theory is presented and applied to simulate various manufacturing processes as metal molding, stamping, plastic injection. Static and dynamic structural analysis, contact, non-linear and thermal simulations are also explained through multiple examples in course and laboratory classes.
CONTENT: Basic theory of finite elements method. FEM analysis: static, frequency, buckling, thermal, optimization. Using SolidWorks Simulation - boundary conditions, loading, materials, initial conditions. Theory of optimal part design. Parameters and structural optimization of parts. Thermoplastic materials injection using Simpoe, best parameters computation, avoiding defects. Stamping process simulation using Stampack – Autoform, process visualization, part defects detection. Metal molding simulation using Vulcan – process visualization, optimal parameters computation, avoiding defects.
TEACHING LANGUAGE: Romanian
EVALUATION: Practical-computer test
BIBLIOGRAPHY (selective):
1.Rinderu, P. and L. Gruionu, Metode Numerice - Elemente teoretice si aplicative. 2003, Craiova, Romania: Universitaria. 210.
2.Viviana FILIP, Cornel MARIN, Lucian GRUIONU, Alexis NEGREA, Proiectarea, modelarea, simularea sistemelor mecanice, utilizând SolidWorks, CosmosMotion şi CosmosWorks, Valahia University Press, Târgovişte, 2008.
3. D. Mazilu, Proiectare asistată de calculator, Reprografia Universităţii, 1998.
4. Cosmos Student Workbook – teorie si exemple - disponibilă în format pdf pe CD în laboratoare.
5. F. Kreith, Mechanical Engineering Handbook, CRC Press, 1999
6. C. Wai-Fah, Structural Engineering Handbook, CRC Press, 1999.

Subject of study: Fluid Mechanics

CODE: D24IPMSL541
NUMBER OF CREDITS: 5
YEAR/SEMESTER: 3rd year/1st semester
TYPE OF COURSE: fundamental
OBJECTIVES: This course is an introduction in fundamental theory of fluid mechanics and application of these principles to solving various technical problems. Numerous examples, hydraulic machines functioning and practical problem solutions are presented to the students in laboratory classes for a better understanding of theoretical knowledge.
CONTENT:
Fluid properties. Fluid modeling models. Pressure in fluids. Cauchy equations. Static of fluids: equations, pressure distribution on plane and curve surfaces. Principle of Archimedes. Fluid kinematics. Continuum equation. Cauchy-Lagrange theorem. Potential and rotational movements. Fluid dynamics. Constitutive equation – laminar flow, Navier-Stokes equations. Bernoulli laminar flow. Hydrodynamics. Applications. Dynamic of viscous fluids. Laminar, transitional and turbulent flow. Turbulent flow equations. Laplace equation. Major loss in ducts, tubes and pipes. Darcy-Weisbach equation for pressure and head loss. Energy and hydraulic grade line. Hydraulic diameter. Water flow in tubes. Orifice, nozzle and venture flow rate meters. Pipe in series and parallel. Pumps, compressors, blowers and fans. Total pressure or head loss in pipe or duct systems.
TEACHING LANGUAGE: Romanian
EVALUATION: Written examination
BIBLIOGRAPHY (selective):
Victor L.Streeter, E.Benjamin Wylie, Fluid mechanics,McGraw-Hill International Book Company Japan,1983.
H.C.Lowe,Fluid Mechanics, The Macmillan Press Ltd. ,London ,1979
Shin-I Pai, Viscous flow theory, D.Van Nostrand Company,Inc. 1957
Dan Gh.Ionescu,Introducere in Hidraulica, Edit.Tehnica, Bucuresti,1977.

SUBJECT OF STUDY: Electronics and Automation

CODE: D24IPMSL542
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 3rd year/1st semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course intents to familiarize the students with the general issues of modern electronics, with the procedures that are used in the study of the electronic devices and the characteristic functions, and also with the most usual electronic circuits. Also, it will be realized an introduction in the field of the general industrial automation.
CONTENT: The general methods those are useful in electronics study. The conduction in semi-conductors. The pn junction. The semi-conductor diodes, The bipolar transistors. The electronics amplifiers. The amplification with reaction. The operational amplifiers (OA). Parameters. The linear applications with OA. The manual regulation. The automate regulation. The automate control systems. The disturbances in the unfolding the processes. Transducers. Regulators. The execution elements. The features of a control system. The modeling of the automation control systems.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):

Th. Dănilă, N. Reus, V. Boiciu, Dispozitive şi circuite electronice, Ed. didactică şi pedagogică, Bucureşti, 1982.
E. Ceangă, A. Saimac, E. Banu, Electronică industrială, Ed. didactică şi pedagogică, Bucureşti, 1981.
Elena Niculescu, I. Smarandache, Circuite electronice. Îndrumar de laborator, Reprografia Univesităţii din Craiova, 1987.
Elena Niculescu, Dorina Purcaru, Dispozitive şi circuite electronice. Culegere de probleme, Reprografia Univesităţii din Craiova, 1988.
D. Mihoc, S.Şt. Iliescu, Teoria şi Elementele Sistemelor de Reglare Automată, Ed. Didactică şi Pedagogică, Bucureşti, 1984.
C. Marin, Structuri şi legi de reglare automată, Ed. Universitaria, Craiova, 2000.
Oncescu M., Îndreptar de radioprotecţie, ICEFIZ, 1981.
Purica I., Sindilaru G., Teoria reactoarelor nucleare. Metode numerice de calcul, Ed. IPB,1988
Şerban D., Dozimetrie şi radioprotecţie, Ed. DOC. ICEFIZ, 1987.
Şindilaru G., Teoria reactoarelor nucleare, Îndrumar de laborator, 1991.
Şindilaru G.Radioecologie.Ed.Bren-2000
Şindilaru G.Noi concepte asupra dozimetriei radiaţiilor.Ed.Bren-2000
Şindilaru G.Prisecaru I,Ghitescu P.Lucrari practice de radioprotectie.Ed.Bren 2002
Şindilaru G. Dozimetria şi protecţia contra radiatiilor Ed.Bren 2002
Şindilaru G. I Purica. N Stan Teoria Reactoarelor Nucleare.Metode numerice de calcul Ed.IPB-1987
Liliana Filimon s. a. , Efectele biologice ale radiatiilor Ionizante, 2000
Helmut Lindner, Elemente de fizica atomica si nucleara, 1960
Milea I. Manga E. s. a. Indrumator de laborator – Fizica Univ. Cluj – Napoca 1996

SUBJECT OF STUDY: Technologies and Equipments for plastic deformation

CODE: D24IPMSL654
NUMBER OF CREDITS: 5
YEAR/SEMESTER: 3rd year / 2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers students theoretical and practical concepts of the metallic materials processing by cold plastic deformation, physical principles of the cold plastic deformation as well as designing of the technologies, stamps and cold dies for processing by cold plastic deformation.
CONTENT: Processing methods by cold plastic deformation. Physical basis of the cold plastic deformation process (Basic plastic deformation laws; Plasticity criteria; Metallic materials deformation behaviour etc.). Theoretical and experimental methods used for plastic deformation analysis. Materials processing by stamping (analysis of the stamping process, force, mechanical work and power in stamping process, influence of the technological parameters, cutting by claws, stamps etc.). Materials processing by bending (analysis of the banding process, force, mechanical work and power in banding process, elastic recovery, bending technology for different workpieces). Materials processing by drawing (analysis of the drawing process, state of stress analysis, force, mechanical work and speed in drawing process, drawing technology of workpieces, active elements sizing.
TEACHING LANGUAGE: Romanian
EVALUATION: Written examination
BIBLIOGRAPHY (selective):

Teodorescu, M, s.a. - Tehnologia presării la rece, Bucuresti, Editura Didacticã si Pedagogicã, 1980;
Teodorescu, M, s.a. - Elemente de proiectare a stantelor si matritelor,Bucuresti, Editura Didacticã si Pedagogogicã, 1983;
Rosinger, St. - Procese si scule de presare la rece. Culegere de date pentru proiectare. Editura Facla, Timisoara, 1987;
Ciocîrdia, C., s.a. - Prelucrări prin deformare plasticã la rece, vol I si II, Ed. Tehnicã, Bucuresti, 1987, 1988;
Ciocîrdia, C., s.a. - Tehnologia presării la rece, Bucuresti, Editura Didacticã si Pedagogicã, 1991;
Neagu Al. - Tehnologia presării la rece. Îndrumar de laborator, Craiova, Reprografia Universitatii, 1985;
Neagu, Al., Ciupitu, I. - Tehnologia presării la rece, Îndrumar de proiectare, Craiova, Reprografia Universitatii, 1987.
Ciupitu I., - Deformari plastice. Tehnologii si echipamente - curs, Craiova, Reprografia Universitatii, 2000.

Subject of Study:
General Economics

CODE: D24IPMSL547
NUMBER OF CREDITS: 3
YEAR/SEMESTER: 3rd year/1st semester
TYPE OF COURSE: B
OBJECTIVES: The essential aim of the course is to train specialists in economics by accumulating theoretical and methodological knowledge necessary to understand the complexity of real

economic life, economic structures' dynamics and of multiple relationships between economic agents. Another purpose is to arouse interest in economics as an e exciting and useful science. Initiation of students into this science will allow analyzing real economic situation, making the right economic decisions and acting accordingly.

CONTENT: ECONOMICS – FORM OF HUMAN ACTIVITY; ECONOMY AND ECONOMIC SCIENCES SYSTEM; MARKET ECONOMY; CONSUMER BEHAVIOR THEORY; THEORY OF MANUFACTURER, SUPPLY AND DEMAND; MARKET, COMPETITION AND PRICE; INCOME; DISTRIBUTION; MEASURING ECONOMIC ACTIVITY AT MACROECONOMIC LEVEL; LABOR MARKET AND UNEMPLOYMENT; MONETARY MARKET AND INFLATION, FINANCIAL MARKET, INCOME, CONSUMPTION AND INVESTMENTS; ECONOMIC FLUCTUATIONS.

TEACHING LANGUAGE: Romanian

EVALUATION: Written/oral examination

BIBLIOGRAPHY (selective):

Angelescu, Coralia (coord.) Economie, Ed. Economică, Bucureşti, 2000.

Angelescu C., Dinu M. s.a. Economie, A.S.E., Editura Economica, Bucuresti, 2009.

Aurel Iancu, Tratat de economie, Bucureşti, Ed. Expert, 1992.

Băbăiţă I., Duţă Alexandrina, Imbrescu I., Microeconomie, Editura de Vest, Timişoara, 2004.

Ciucur Dumitru, Gavrilă Ilie, Economie, Ed. Economică, Bucureşti, 1999.

Dobrotă Niţă (coord.), Dicţionar de economie, Ed. Economică, 1999.

Dobrotă, Niţă, Economie politică, Ed. Economică, Bucureşti, 1998.

Dudian Monica (coord.), Economie, Ed. All Beck, Bucureşti, 2005.

Nechita V., Ciupercă L., Iorga A.I., Economie, Ed. Sedcom Libris, Iaşi, 2001.

Pîrvu Gh., Gruescu Costina, Microeconomie: manual universitar, Ed. Sitech, Craiova, 2005.

Vîrjan Daniela, Economie, Editura ASE, Bucureşti, 2009.

Milea Claudia, Economie generală, Ed. Universitaria, Craiova, 2010.

Subject of study:
Environmental economy and accounting

CODE: D24IPMSL657

NUMBER OF CREDITS: 4

YEAR/SEMESTER: 4th year/1st semester

TYPE OF COURSE: speciality

OBJECTIVES: This course addresses students in the field of environmental engineering with focus on environmental issues, so that they can turn after graduation to the economic, managerial and accounting knowledge in environment science learned. Because of its content, the course aims at deepening the theoretical knowledge of the economic framework and applied research in economics and environmental accounting.

CONTENT: Environmental economics in the environmental sciences system; Environment-economy relationship; Environment and economic structures; Sustainable development; Economic component in the global environmental policy; Economic evaluation of environmental goods and services, National system of accounting and environmental accounts; Financial and economic measures for the protection of environment and natural resources; Content and importance of the environment' economy; Analysis of economic structures from ecological perspective; Composition of accounts and costs' system and evaluation of economic results, Environmental costs, environmental indicators and environmental strategies - economic instruments that encourage conservation of natural resources.

TEACHING LANGUAGE: Romanian

EVALUATION: Written/oral examination

BIBLIOGRAPHY (selective):

Milea, C., Economia şi contabilitatea mediului - Note de curs, curs litografiat.

Ciobotaru V., Socolescu Ana Maria, Priorităţi ale managementului mediului, Editura Meteor Press, Bucureşti, 2006.

Frăsineanu I., Băloiu L., Economia şi protecţia mediului înconjurător. Editura ASE, Bucureşti, 2007.

Părăuşanu, V., Ponoran, I.,

Ciobotaru V., Economia protecţiei mediului ambient. Editura Metropol, Bucureşti, 1993.

Rusu T., Ghereş M., Economia mediului, Editura Risoprint, Cluj-Napoca, 2008.

Vladimir Rojanschi, Florina Bran, Florian Grigore, Elemente de economia si managementul mediului, Editura Economica, Bucuresti, 2004.

Vladimir Rojanschi, Florina Bran, Politici şi strategii de mediu, Editura Economică, Bucureşti, 2002.

Vladimir Rojanschi, Florina Bran, Florian Grigore, Abordări economice în protecţia mediului, Ed. ASE, Bucureşti, 2003.

Rojanschi Vl., Bran Florina şi alţii, Economia şi protecţia mediului, ediţia a II-a, Ed. Tribuna Economică, Bucureşti, 1997.

Subject of study:
Machine organs and mechanisms

CODE: D24NTMFL546 + D24NTMFL651

NUMBER OF CREDITS: 5 + 3

YEAR/SEMESTER: 3nd year/1nd + 2nd semester

TYPE OF COURSE: domain

OBJECTIVES: The course is designed to help students understand the importance of design

- Knowledge of the necessary notions in the representation of machine mechanisms and machinery;
- Knowledge of the application states studied and applied to the machine organs in operation.

CONTENT: Introduction, Mechanism structure, Mechanics kinematics, Dynamic analysis, Mechanics of the mechanism, Camshafts, Helical gear transmissions, Gear transmissions, Belt transmissions, Chains transmissions, Demountable assemblies, Non-assembled assemblies, Axles and shafts Pivots, Friction gears, Mechanical drives, Couplings, Elastic couplings

TEACHING LANGUAGE: Romanian

EVALUATION: Written/oral examination

BIBLIOGRAPHY (selective):

1.Dumitru N., Margine A., Organe de maşini. Asamblări. Elemente elastice. Proiectare asistată de calculator. Editura Universitaria Craiova, 2002.

2.Dumitru N., Margine, A., Catrina, Gh., ş.a., Organe de maşini. Arbori şi lagăre. Proiectare

asistată de calculator, Editura Tehnica, Bucureşti, 2008, ISBN 978-973-31-2332-3.
3.Dumitru, N. Margine, A.,Asamblări. Elemente elastice. Proiectare asistată. Editura Universitaria, Craiova, 2002.
4.Dumitru, N., Angrenaje cilindrice. Proiectare asistată de calculator, Ed.Universitaria,Craiova, 2000
5.Dumitru, N., Nanu, Gh., Mecanisme şi transmisii mecanice, Editura Universitaria , Craiova, 2008.
6.Dumitru, N.,Organe de maşini.Angrenaje. Elemente de proiectare, R. Univ. Craiova, Craiova, 1996.
7.Dumitru, N., Organe de maşini. Transmisii mecanice, R. Univ. Craiova, Craiova,1996.

Subject of study:
Environmental management

CODE: D24IPMSL652
NUMBER OF CREDITS: 3
YEAR/SEMESTER: 3nd year/1st semester
TYPE OF COURSE: domain
OBJECTIVES: - Limited interpretation of the concepts, approaches, theories, models and basic methods used in well-defined exploitation issues that take place in the treatment and depollution of environmental factors
- Interpretation of basic theories, models and methods used in well-defined technological calculations of depollution installations
- Explain basic theories, models and methods specific to pollutant monitoring programs in industrial installations
- Applying fundamental concepts and theories in the field of communication and management for professional development regarding the reduction of environmental impact of industrial pollutants
- Defining elementary concepts related to environmental quality control, risk assessment and low-impact technology development
- Selection of concepts, approaches, theories, models and basic methods for the development and operation of pollutant monitoring programs in industrial installations
CONTENT: National Strategy for Sustainable Development of Romania.
Horizons 2013-2020-2030. The general foundations of management.
Defining the environmental management system (EMS). Characteristics of EMS
Environmental management systems according to ISO 14001
Components of EMS. Environmental policy. Environmental inspection.
EMAS - European Union Environmental Management System
Integrated quality-environment management systems
Integrated management systems
quality - environment - occupational health and safety
Process-based approach - Life Cycle Analysis
Process Approach - Eco-Design
Labels and environmental statements
Assessment of environmental performance
Waste management is an integral part of organic management
TEACHING LANGUAGE: Romanian
EVALUATION: Written examination
BIBLIOGRAPHY (selective):
1. Demian M., Ciobanu, M., Management ecologic – Note de curs
2. Apostol, T., s.a. – Managementul sistemelor de mediu, Ed. Politehnica Press, Bucureşti, 2005
3. Apostol, T., Managementul sistemelor de mediu, Ed. Politehnica Press, Bucureşti, 2005
4. Maior, C., Grec, A, Managemnt ecologic, Editura Vasile Goldis University Press, Arad 2008
5. Baron, V. Practica managementului de mediu ISO 14001, Editura Tehnica, 2001
6. Inculescu, S., Nisipeanu, S., Stepa, R., Management Mediului in conformitate cu seria ISO 14000,Matrixrom, Bucuresti, 2002

Subject of study:
Economy and environmental accounting

CODE:
NUMBER OF CREDITS: 3
YEAR/SEMESTER: 3nd year/2nd semester
TYPE OF COURSE: domain
OBJECTIVES: The main objective of the course is formation
professionals in the environmental economy have profound
theoretical and methodological knowledge, indispensable for
understanding the complexity of the environment and
economic development, indicators and performance environment;
Another goal is to raise interest in the environment the environment, to know the ecological behavior of consumers and businesses;
Getting started in this science will allow us to analyze the situation
the current environment, making the right decisions and acting in
rationally, developing strategies to protect.
CONTENT: Environment protection
Sustainable development and indicators sustainable development
Environmental indicators and performance 4
Mechanisms and tools of sustainable development
Macroeconomic management of environmental protection
Elements of environmental accounting
Modeling of socio-media macrorelations
Elaboration of an environmental protection strategy
Organic behavior of consumers and businesses
Organic product policy
LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
1. Vladimir Rojanschi, Florina Bran – Conceptul și politica de produs ecologic;
2. Frăsineanu I., Băloiu L. - Economia și protecția mediului înconjurător. Editura ASE, București, 2007;
3. Părăușanu, V., Ponoran, I., Ciobotaru V. – Gestionarea bmacroeconomică a protejării mediului;

4. Rusu T., Ghereș Marinela – Elemente de contabilitatea mediului;
5. Vladimir Rojanschi, Florina Bran, Florian Grigore – Modelarea macrorelațiilor societatemediu;

Fourth year of study:

Subject of Study: Biodiversity

CODE: D24IPMSL763
NUMBER OF CREDITS: 5
YEAR/SEMESTER: 4nd year/first semester
TYPE OF COURSE: mandatory
OBJECTIVES: The course provides students with theoretical and practical concepts on environmental issues.
Acquiring basics on soil characteristics, soil physical and chemical properties - identify the main human activities impact on the natural environment and consideration of environmental concerns into sustainable development.
CONTENT: Scope and role biodiversity: Definitions of biodiversity. Biodiversity evolution as science. History. biodiversity factors and their role in soil formation process. Climate. Relief. Time. Water. Bodies. Human factor. Solid phase of the soil. Mineral. Organic. Formation and composition of the soil profile. biodiversity processes. biodiversity horizons and features. Soil profiles. Morphological properties of the soil. Physical properties of soil. Texture. Structure. Other (water, air, temperature). Chemical properties of the soil. Soil solution. Soil colloids and their properties. Soil acidity and alkalinity. Redox processes
Soil classification and characterization. Soil types in Romania. Degradation and soil pollution. Soil pollution abatement processes. Measures against soil pollution.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Ciobanu, M., Ecopedologie – Note de curs
G., Lupascu, C., Rusu, C., Secu, **Pedologie**, Caiet de lucrari practice, Editura Universitatea "Alexandru Ioan Cuza", Iasi , 2001.
G., Blaga, F., Filipov, I., Rusu, S., Udrescu, **Pedologie**, Editura AcademicPres, Cluj 2005
C., Chirita, Ecopedologie cu baze de pedologie generala, Editura Ceres, Bucuresti, 1974
Cristina Simion, **Protectia Mediului**, Editura Bren, Bucuresti, 2007
Florinela Ardelean, Vlad Iordache, **Ecologie si protectia mediului**, Editura Matrix, Bucureşti, 2007
A., Banu, O., Radovici, **Elemente de Ingineria si Managementul mediului**, Editura Tehnica , Bucuresti, 2007
Al., Ionescu, V., Sahleanu, C., Bindiu, **Protecţia mediului inconjurator si educatie ecologica**, Editura Ceres, 1989
Rojanschi, V., F. Bran, G. Diaconu, **Protecţia şi ingineria mediului**, Editura Economica, Bucureşti, 1997

Subject of study:
Drinking water and industrial water technology

CODE: D24IPMSL767
NUMBER OF CREDITS: 4
YEAR/SEMESTER: 4nd year/1st semester
TYPE OF COURSE: specialized
OBJECTIVES: The course provides students with theoretical and practical on water flow in aquifers, aquifer formation, modeling flow in aquifers, their interaction with the environment, physical aspects of the problem, the phenomena governing equations and methods of solving these equations, modern notions about groundwater pollution, modern computer programs, specific to groundwater, water and industrial water technology.
CONTENT: Introduction. General concepts of hydrogeology. Origin of groundwater. Factors influencing water infiltration and hydrogeological characteristics of the land. Groundwater flow. Groundwater flow factors. Laminar and turbulent groundwater.
The main parameters characterizing groundwater flow. Groundwater direction. Height aquifers free and pressure (captive). Variation of groundwater levels. Springs. Classification springs. Mineral waters. Water. Research and exploitation of groundwater. Groundwater resources in Romania. Pollution and groundwater pollution prevention. Groundwater remediation methods
Water and industrial water technology
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Ciobanu, M., Ingineria apelor subterane – Note de curs
G., Neag, A., Culic, Soluri si ape subterane poluate. Tehnici de depoluare, Editura Dacia, 2001, Cluj Napoca
G., Neag, Depoluarea solurilor si apelor subterane, Editura Dacia, Cluj Napoca
I., Pisota, L., Zaharia, Hidrologia uscatului, Bucuresti, 2003

Subject of study:
Sources, processes and polluting products

CODE: D24IPMSL768
NUMBER OF CREDITS: 5
YEAR/SEMESTER: 4nd year/first semester
TYPE OF COURSE: mandatory
OBJECTIVES: The course provides students with theoretical and practical concepts on environmental issues.
It is aimed at presenting and learning key aspects of environmental preservation technologies under development sweeping the exploitation of natural resources, with a focus on the most important pollutants affecting the three components of global environmental, soil, water and air.
CONTENT: Natural environmental pollutants. Activities of human communities that pollute the environment. Industrialization: mining, steel industry, chemical industry, building materials and other industries. Production of electricity and heat. Environmental impact of power plants. Transport.

Agriculture. Household activities. Noise as a factor of environmental pollution. Environmental impact of waste: packaging waste, medical waste, VSU, DEEE. Major sources of pollution risk to human health. Physicochemical methods of analysis of environmental pollutants factors. Methods for reducing emissions of pollutants

TEACHING LANGUAGE: Romanian

EVALUATION: Written/oral examination

BIBLIOGRAPHY (selective):

Ciobanu, M., Factori poluanţi ai mediului – Note de curs

V., Nistreanu, G.,Dumitran, **Elemente de Ecologie**, Editura Bren, Bucuresti, 1999

Cristina Simion, **Protectia Mediului**, Editura Bren, Bucuresti, 2007

Maria Popescu, Miron Popescu, **Ecologie aplicata**, Editura Matrix, Bucureşti, 2000

Florinela Ardelean, Vlad Iordache, **Ecologie si protectia mediului**, Editura Matrix, Bucureşti, 2007

*** Cele mai bune practici disponibile în domeniu-BREF

Subject of study: Surface engineering

CODE: D24IPMSL879

NUMBER OF CREDITS: 4

YEAR/SEMESTER: 4th year/2nd semester

TYPE OF COURSE: fundamental

OBJECTIVES: The course offers the students theoretical and practical concepts regarding machinability of the parts, precision as well as knowledge to design a machining process

CONTENT: Machinability of the parts, Machining precision.The quality of machined surfaces. Calculus of the cutting regime parameters. Cutting process of the flat surfaces. Cutting process of the revolution surfaces

TEACHING LANGUAGE: Romanian

EVALUATION: Written/oral examination

BIBLIOGRAPHY (selective):

Aelenei, M., Ghergia, I., - Probleme de maşini unelte şi aşchiere, vol. I, II, Editura Tehnică, Bucureşti, 1985

Benga G., Ciolacu, F.G., - Prelucrări mecanice şi control dimensional, Ed. Universitaria, Craiova, 2003.

Botez, E., - Bazele generării suprafeţelor pe maşini unelte, Ed. Tehnică, Bucureşti, 1966

Picoş, C., - Proiectarea tehnologiilor de prelucrare mecanică prin aşchiere, Editura Universitas, Chişinău, 1992

Popovici, C., Savii, Gh., Killman, V., - Tehnologia construcţiilor de maşini, Ed. Tehnică, Bucureşti, 1967

Trent, E.M., - Metal Cutting, Editura Butterworth-Heinemann, Fifth Edition, 2002

Subject of study:
Materials and clean technologies

CODE: D24IPMSL765

NUMBER OF CREDITS: 3

YEAR/SEMESTER: Fourth year /second semester

TYPE OF COURSE: mandatory

OBJECTIVES: Discipline "Materials and clean technologies" aims at initiating students on environmental protection and waste management

Law 137/1995 on environmental protection and government decisions on waste management track pollution regulations and operation of national and international organizations for environmental protection

The focus is put on acquiring the main methods and clean technologies used in industry.

The main objective is knowledge and characterization of clean energy sources

CONTENT: The monitoring of environmental quality, Introduction to Environmental Impact Assessment. Clean energy and clean energy sources.

Classification of unconventional technologies for energy: Renewable and non-renewable.

Energy sources.

Clean technologies for power generation

Solar energy.

Wind. Construction, types of turbines

Unconventional technologies for obtaining clean energy

a. hydropower

b. Types of turbines

Biotechnology- Classical and modern biotechnology

Geothermal energy.

Construction equipment

XXI Energy century. Nuclear energy and human society

Hydrogen production technologies

Recovery techniques and waste processing

The concept of sustainable development

TEACHING LANGUAGE: Romanian

EVALUATION: Written

BIBLIOGRAPHY (selective):

Demian Mihai – Materiale si tehnologii nepoluante – Notiţe de curs

XXX - Legea 137/1995, privind protecţia mediului şi hotărâri de guvern referitoare la normative de poluare evidenţa gestiunii deşeurilor şi funcţionarea unor organisme naţionale şi internaţionale pentru protecţia mediului

Rojanschi V., Bran F. “Politici şi strategii de mediu ”, Editura Economică, 2002

Enescu M., -“Tehnologii nepoluante ” Editura Drobeta, 2004

Rojanschi V., Bran F., Diaconu S., Grigore F. “Abordări economice în protecţia mediului ”, Editura ASE Bucureşti, 2003

Subject of study:
Reconditioning Technologies

CODE: D24IPMSL881

NUMBER OF CREDITS: 3

YEAR/SEMESTER: 4year/ 8 semester

TYPE OF COURSE: optional

OBJECTIVES: Discipline shows students how the recovery and recycling of reusable materials with direct involvement in the design of technologies and equipment that lead to obtaining raw materials from waste.

CONTENT:

Effective management of waste.

Recovery and recycling metalice.Procese specific technology. Recovery of waste iron and steel. Waste recovery and metal alloys. Recycling swarf from grinding. Recovery and recycling of textile fibers and glass fibers. Paper recovery and

recycling of waste paper. Recovery and recycling of plastics. Recovery
and recycling of polymers from rubber tires. Recovery and recycling of waste. Recycling parts by reconditioning, regeneration reshuffle. The wearing of tree, bush, housing.
TEACHING LANGUAGE: romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Radu, St. - Recovery, recycling and recycling materials - Course Notes
Şontea, S.,Mangra, M.,Didu, M.,Văduvoiu, Gh.,s.a.- Processing of recyclable materials to obtain raw materials, Universitaria Publishing Craiova 1998
Rusu, M.,s.a.,- Capitalization of secondary polymer, Technical Publishing House Bucharest 1989
Antonescu, N., s.a, - Energy recovery from waste, Technical Publishing House Bucharest 1988

Subject of study:
Selection and utilization of the materials

CODE: D24IPMSL764
NUMBER OF CREDITS: 4
YEAR/SEMESTER: third year / first semester
TYPE OF COURSE: speciality
OBJECTIVES: Discipline "Selection and utilization of the materials" aims to familiarize students with the main metallic materials and their equilibrium diagrams. The focus is laid on steel and cast Fe-C diagram shown in going through the elements of heat treatment and non-ferrous materials.
This knowledge, provided students are required to understand the main qualities that a product must meet. Also, the knowledge gained may allow improvement of technological processes.
The main objective is the acquisition mode selection for a particular product.
CONTENT: Properties of metallic materials, physical properties, mechanical properties, technological properties, structure-property Interdependence, steels and cast irons, Classification, Influence of alloying elements, typing, choice of materials metal of choice criteria, factors to be considered in the design, form part properties of metallic materials, external factors, chemical composition of materials and recommendations metalicePrincipii industries, welded structures, tanks, boilers, parts and MO heat treated equipment working in corrosive / oxidizing machinery working in environments with hydrogen Springs, Parts ambutizare principles and recommendations made by the fields
- Welded structures, tanks, boilers
- Parts and O.M. annealed
- Equipment working in corrosive / oxidizing
- Equipment working in environments with hydrogen
- Springs
- Parts formed by ambutizare
- Bearings
- Fasteners
- Valves
- Tools

TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral
BIBLIOGRAPHY (selective):
Al. Domsa, S. Domsa – Materiale metalice in construcţia de maşini, Ed. Dacia, 1981
M., Truşculescu “Studiul Metalelor” Editura Didactică şi Pedagogică Bucureşti, 1982
M. Demian - Alegerea Şi Utilizarea Materialelor, Notiţe de curs
M. Demian - Alegerea Şi Utilizarea Materialelor, Îndrumar proiectare. Notiţe
M., Truşculescu, “Analize si Încercări ale materialelor metalice” Timişoara 1992

Subject of study:
Cutting machining

CODE: D24IPMSL771
NUMBER OF CREDITS: 5
YEAR/SEMESTER: 3rd year/2nd semester
TYPE OF COURSE: fundamental
OBJECTIVES: The course offers the students theoretical and practical concepts of the surfaces generation, physical principles of the cutting process as well as a knowledge of the characteristics phenomena of the cutting processes
CONTENT: Kinematics of cutting process. Physical principles of cutting process (chips formation and types of chips, the importance of chips shape, built-up-edges etc.). Plastic deformations of workpiece material. Forces and power in cutting processes, thermal phenomena in cutting processes. Cutting fluids. Tool wear and tool life. Vibration in cutting process. The quality of machined surfaces.
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):
Benga, G., Ciolacu, F. - Prelucrări mecanice şi control dimensional, Editura Universitaria, 2003
Ciolacu, F.G., Mazilu D., Crăciunoiu N., Aşchiere şi procedee de prelucrare, Reprografia Universităţii din Craiova, 1999.
Ciolacu, F.G.,Crăciunoiu, N., Benga, G.C, Aşchiere şi procedee de prelucrare, Editura Sitech, Craiova, 2008.
Cozmincă, M.,Panait, S., Constantinescu, S., Bazele aşchierii, Editura Instit. Politehnic, Gh. Asachi, Iaşi, 1995
DeGarmo, E.P., Black, J.T., Kohser, R., Materials and Process in Manufacturing, Eight Edition, Pretince Hall, Upper Saddle River, NJ, 1997.
Oprean, A., ş.a., Bazele aşchierii şi generării suprafeţelor, Editura Didactică şi Pedagogică, Bucureşti, 1981;
Popescu I., Teoria aşchierii, Universitatea din Craiova, Facultatea de Mecanică, 1994.
Trent, E.M. - Metal cutting, editura Butterworth-Heinemann, Fifth
edition, 2002

Subject of study:
Thermal and surface treatment

CODE: D24IPMSL878
NUMBER OF CREDITS: 3
YEAR/SEMESTER: 4nd year/2nd semester
TYPE OF COURSE: mandatory
OBJECTIVES: Knowledge of the specific thermal, thermo-chemical and surface treatments applicable to ferrous alloy parts in the machine and appliance industry, the development of knowledge in the field, the development of communication skills and the formation of a creative attitude. Understanding the application of thermal and surface treatments to

improve the mechanical properties of materials used in machine tool manufacturing.
Explanation and interpretation of thermal, thermo-chemical and surface treatment techniques applicable to parts made of ferrous alloys.
CONTENT: 1. Diagram of Fe3C; The importance of surface treatments in the practice of thermal treatments (structure and properties of iron, Fe-Fe3C metallist system balance diagram, phases and constituents in the Fe-Fe3C alloy system, structure of carbon steels and white pigments, primary and secondary crystallisation, classification of treatments thermal, the importance of surface treatments in the practice of thermal treatments);
2. Theory of thermal treatments (structural changes in steels, critical points, transformations to steel heating, transformations to steel cooling)
3. Thermal treatment technology (parameters of thermal treatments and used equipment, heating, heating speed and duration, heating media, maintenance, thermal equalization duration, structural transformation duration, cooling, cooling rates and cooling times, cooling media)
4. Thermal quenching treatments
- Volumizing
- surface quenching (superficial: superficial flame healing, superficial induction hardening, superficial quenching in the electrolyte)
5. Thermochemical treatments (carburizing, nitriding, carbonitrulation)
6. Metal diffusion deposition (alloying, chromium plating, nickel plating, silicification, titanisation, sherardization and zinc coating, boring)
7. Modern superficial treatments and thermal treatments specific to powder metallurgy (treatments in water vapor, thermosonic treatments, microwave treatments, laser treatments, specific powder metallurgy treatments)
TEACHING LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):

1.S.Şontea, D.Tărâţă – Tratamente termice şi termochimice, Editura Scrisul Românesc, Craiova, 2001,
2.Mihail Mangra – Tratamente termice şi de suprafaţă, Curs, Tipografia Universităţii din Craiova, 2003,
3.Traian Popescu – Tratamente termice şi de suprafaţă, Tipografia Universităţii din Craiova, 2005
4.Traian Popescu –Experimente în tratamente termice, Editura Universitaria din Craiova, 2007
5. Traian Popescu – Tratamente termice în metalurgia pulberilor, Editura Universitaria din Craiova, 2008

Subject of study:
Environmental audit

CODE:
NUMBER OF CREDITS: 2
YEAR/SEMESTER: 3nd year/2nd semester
TYPE OF COURSE: domain
OBJECTIVES: Acquiring specific notions and practices of managerial environmental auditing and how they align with the organization's policies to meet current environmental regulations.
1. Comply with the requirements of ISO 19011
2. Carrying out the environmental audit plan in organizations
3. Continuous improvement through internal and external auditing.
CONTENT: Audit within the Environmental Management System. Standard 19011
Auditing principles
Types of environmental audit
Coordination of the environmental audit program
Performing the environmental audit
Competence and evaluation of auditors
Community eco-management and audit scheme (EMAS)
LANGUAGE: Romanian
EVALUATION: Written/oral examination
BIBLIOGRAPHY (selective):

1. Ghermec, O., Audit de mediu - Note de curs
2. Apostol, T., s.a., Managementul sistemelor de mediu, Ed. Politehnica Press, Bucureşti, 2005
3. Simion, C., Protecţia Mediului, Editura Bren, Bucureşti, 2007
4. Ardelean, F., Iordache, V., Ecologie şi protectia mediului, Editura Matrix, Bucureşti, 2007
5. Banu, A., Radovici, O., Elemente de Ingineria şi Managementul mediului, Ed.Tehnică , Bucureşti, 2007