Faculty of Engineering and Agronomy in Braila

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Agronomy	BA	Agriculture / Engineer	I	I	**Chimie/Chemistry** *Contents* 1.The structure of the atom. Subatomic particles 2. The periodic system of the elements 3. Chemical bonds 4.Chemical reactions 5. Aggregation states of matter 6. Calculation elements in chemistry 7. Acids and bases. Ionic balances 218. The chemistry of chemical elements and compounds	4
Agronomy	BA	Agriculture / Engineer	I	I	**Biophysics and agrometeorology Course content:** **CAP. 1 ELEMENTS OF CLASSICAL MECHANICS,** 1.1 Sizes characteristic of classical mechanics, 1.2 Fundamental principles of classical dynamics, **CAP. 2 FUNDAMENTAL NOTIONS OF THERMODYNAMICS,** 2.1 Thermodynamic systems and parameters, 2.2 Principles of thermodynamics, 2.2.1 General principle of thermodynamics, 2.2.4 Internal energy, mechanical work and heat, 2.2.5 First principle of thermodynamics, 2.2.7 Second principle of thermodynamics, 2.2.8 The third principle of thermodynamics, **CAP. 3 THERMAL RADIATION,** 3.1 Characteristic sizes, 3.2 Black body, 3.3 Stefan-Boltzmann Law, **CAP. 4 ATMOSPHERE. ATMOSPHERIC PRESSURE,** 4.1 Composition of atmospheric air, 4.2 Vertical structure of the atmosphere, 4.3 Variations in atmospheric pressure, 4.3.1 Variation of atmospheric pressure with height, 4.3.2 Reduction of pressure at sea level, 4.3.3 Daily variation of atmospheric pressure, 4.3.4 Variation annual of atmo/spheric pressure, 4.3.5 Non-periodic variations of atmospheric pressure, **CAP. 5 AIR TEMPERATURE. AIR MOVEMENTS**, 5.1 Air temperature variations, 5.1.1 Daytime air temperature variation, 5.1.2 Annual air temperature variation, 5.1.3 Non-periodic air temperature variations, 5.2 Adiabatic transformations in the atmosphere, 5.2.1 Adiabatic variations in the case of humid air unsaturated, 5.2.2 Adiabatic variations in the case of saturated humid air, **CAP. 6 THERMAL REGULATION OF THE SOIL**, 6.1 Thermal	4

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					properties of the soil, 6.2 Heating of the soil surface, 6.2.1 Daytime caloric balance of the soil surface, 6.2.2 Night-time caloric balance of the soil surface, 6.3 Soil temperature variation, 6.3.1 Daytime temperature variation soil, 6.3.2 Annual variation of soil surface temperature, 6.4 Mechanism of heat propagation in soil, 6.5 Variation of soil temperature with depth, 6.5.1 Daily variation of soil temperature with depth, 6.5.2 Annual variation of soil temperature with depth, 6.6 Layer with constant temperature, 6.7 Vertical distribution of soil temperature, **CAP. 7OF WATER VAPORS. ATMOSPHERIC PRECIPITITIES,** 7.1 Water vapor in the atmosphere, 7.1.1 Forms under which water appears in the atmosphere, 7.1.2 Water vapor penetration into the atmosphere, 7.1.3 Evaporation, 7.1.4 The dimensions that define the humidity of the air, 7.1.5 Distribution vertical of water vapor pressure, 7.1.6 Geographical distribution of atmospheric moisture, 7.1.7 Daily and annual variation of air humidity, 7.2 Condensation of water vapor, 7.2.1 General, 7.2.2 Condensation nuclei, 7.2.3 Production condensation phenomenon, 7.2.4 Condensation of water vapor on the earth's surface, 7.2.5 Fog and mist, 7.2.6 Clouds, 7.3 Atmospheric precipitation, 7.3.1 Mechanism of precipitation formation, 7.3.2 Factors that determine the droplet growth in clouds, 7.3 .3 Droplet drop rate, 7.3.4 Precipitation pattern, 7.3.5 Main forms of precipitation, 7.3.6 Precipitation classification, 7.3.7 Daily and annual precipitation variations, 7.3.8 Snow layer	
Agronomy	BA	Agriculture / Engineer	I	I	Botany I 1. Introduction - Stages of botany development on a global and national level; the object of study and the connection of botany with other disciplines. 2. Plant cytology - Single and multicellular plants; Types of plant cells (prokaryotes and eukaryotes); The living and non-living constituents of the cell; The cell division. 3. Histology - Plant tissues, definition, generalities, process and investigation methods; structural classification and organization; Meristematic tissues; Primary and secondary defense tissues; Fundamental tissues (parenchyma); Assimilating tissues; Storage tissues; Conductive tissues; Mechanical tissues; Special tissues.	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					4. Organography - Root: generalities; morphology; morphological types of roots; Root anatomy (primary and secondary root structure). 5. Organography - Stem: generalities; morphology; morphological types of stems; air stems; metamorphosed stems; stem anatomy; primary and secondary structure. 6. Organography - Leaf: leaf formation; arrangement and succession of leaves on the axis of the stem; leaf morphology and anatomy (limb and petiole structure). 7. Plant propagation - Types of propagation; Angiosperms reproduction - The angiosperms flower. 8. Flower - Origin and composition; Inflorescence; Floral formulas and charts; Flowering; Pollination; Angiosperms fertility 9. Fruit - morphology and the fruits classification. 10. Seed - Morphology and structure; The dissemination and seeds spreading	
Agronomy	BA	Agriculture / Engineer	I	II	Botany II 1. Introduction notions of plants taxonomy and systematics. Taxonomic units. Classification systems 2. Monerea Kingdom 3. Protista Kingdom 4. Fungi Kingdom 5. Plantae Kingdom - Bryophyta and Pteridophyta Phylum - Pinophyta Phylum - Magnoliophyta Phylum. Magnoliopsida Class - Magnoliidae subclass - Magnoliophyta Phylum. Magnoliopsida Class - Hamamelidae subclass - Magnoliophyta Phylum. Magnoliopsida Class - Rosidae subclass - Magnoliophyta Phylum. Magnoliopsida Class - Rosidae subclass - Magnoliophyta Phylum. Magnoliopsida Class - Rosidae subclass - Magnoliophyta Phylum. Magnoliopsida class - Rosidae subclass, ord. Saxifragales and Rosales - Magnoliophyta Phylum. Magnoliopsida Class - Caryophyllidae and	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Asteridae subclass - Magnoliophyta Phylum. Magnoliopsida Class - Asteridae subclass - Magnoliophyta Phylum. Poales Order (Graminales)	
Agronomy	BA	Agriculture / Engineer	I	II	**BIOCHEMISTRY** **1. Object of the biochemistry** 1.1. Definition 1.2. Branches 1.3. General chemical composition of the plant organism Water - physico-chemical properties and biochemical role Mineral salts — classification, biochemical role Organic substances — classification, general chemical properties **2. Carbohydrates** 2.1. Definition, dissemination, nomenclature, classification 2.2. Biochemical role 2.3. Monosaccharides 2.4. Oligosaccharides 2.5. Polysaccharides **3. The lipids** 3.1. Definition, resin@nerea, nomenclature, classification 3.2. Biochemical role 3.3. Fatty acids 3.4. Lipids constitution alcohols 3.5. Simple lipids 3.6. Complex lipids **4. The Proteins** 4.1. Definition, resin@nerea, nomenclature, classification 4.2. Biochemical role 4.3. Amino acids 4.4. Peptides 4.5. Proteins	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					5. Nucleic acids 5.1. Cell location and biochemical role 5.2. Nitrogenous bases 5.3. Pentoze 5.4. Phosphoric acid 5.5. Nucleosides 5.6. Nucleotides 5.7. Deoxyribonucleic acids 5.8. Ribonucleic acids **6. Enzymes** 6.1. Structure and conformation 6.2. Nomenclature and classification 6.3. Mechanisms for action 6.4. Biochemical role 6.5. Factors influencing enzymatic activity 6.6. More important representatives, enzymatic preparations **7. Vitamins** 7.1. Definition, spreadind, nomenclature, classification 7.2. Biochemical role 7.3. Liposoluble vitamins 7.4. Water soluble vitamins **8. Phytohormone, retarders, inhibitors, vegetal pigments, phytooncides** 8.1. Definition, spreading, nomenclature, classification 8.2. Biochemical role 8.3. More important representatives **9. Metabolism of carbohydrates** 9.1. Carbohydrate anabolism 9.1.1. Photosynthesis 9.1.2.Biosynthesis oligoglucides 9.1.3. Starch biosynthesis 9.2.Cathabolism of carbohydrates 9.2.1. Glycolysis 9.2.2.Aerobic Cathabolism	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					9.2.3.Krebs cycle **10. Metabolism of lipids** 10. 1.Anabolism of glycerol 10.1.1. Biosynthesis of glycerol 10.1.2.Biosynthesis of fatty acids 10. 1.3. Biosynthesis of triglycerides 10.2. Cathabolism of glycerides 10.2.1. Cathabolism of glycerol 10.2.2.Fatty acid Cathabolism 10.3. Metabolism of complex lipids **11. Protein metabolism** 11.1. Metabolism of amino acids 11.1.1. The biosynthesis of amino acids 11.1.2. Cathabolism of amino acids 11.2. Metabolism of nucleoprotein **12 . Biochemical adaptation of plants to the environment. Plant pollution.**	
Agronomy	BA	Agriculture / Engineer	I	I	**Mechanical Engineering Elements II** The first part presents the machine parts design basics, design methodology and the machine parts materials. In the following chapters there are presented the basics for fixed assemblies, removable assemblies, welded assemblies, rivet assemblies. There are also presented the basics for bearing. The all the above machine parts mentioned there are presented the function principle, efforts and all kind of resistance moments and the calculus methodology. In the following chapters there are presented the working principle, efforts and all kind of resistance moments and the calculus methodology for gears, shafts, belt drives, chain drives, spee variators, couplings, springs, sealings. At the end it is presented a sistemic design for a complex gearbox. The theoretical notions are demonstrated with practical works and a didactic project.	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Agronomy	BA	Agriculture / Engineer	I	II	**Energy basis of agriculture**. **Course content:** Introductory notions about engines with internal combustion (ICE). Gas exchange. Fuels. Properties of fuels. Spray the fuel. Burning. Construction of mobile elements of ICE. Construction of ICE fixed parts. Auxiliary systems. Gas distribution system. Fuel supply systems of ICE. The lubrication system. Cooling system. Transmission of tractors.The role and classification of transmissions. Typical schemes. Clutch. The gearbox. Central transmission. Differential. Final transmission. Braking system. Steering system. Hydraulic and pneumatic installations. Hydraulic schemes. Components. (hydraulic motors, pumps, valves, distributors). Fans. Compressors. Refrigeration plant.	4
Agronomy	BA	Agriculture / Engineer	I	II	**Organic farming** Course content: Chapter 1. Introductory notions and the history of organic farming. Concepts from organic farming system. Chapter 2. Means and products allowed in organic farming. Chapter 3. The principles and role of ecological agriculture. The objectives of organic farming. Chapter 4. Packaging and labeling of organic products. Chapter 5. Location, dimensions and duration of agro-ecological systems. Chapter 6. Land cultivation and raising of animals in ecological system and processing of agricultural products and organic food. Content of the seminar or practical work: S1- Knowledge of agricultural sciences. Knowledge of vegetation factors in organic farming. S2- Agricultural biodiversity. General notions.Classification of cultivated plants. Genetically modified organisms. S3- Material support of agricultural production. Biological propagation material. Natural fertilizers and biological amendments. Pesticides and their influence on sustainable agriculture. Agricultural machinery and equipment specific to organic farming. S4- General methods of sustainable agricultural technique. Soil works. Sowing and planting. Cultivation works. Harvesting and storing and preserving plant	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					products.	
Agronomy	BA	Agriculture / Engineer	I	I	**Ecology and Environmental Protection** The content of the course: 1.Introduction 2.The structure and the composition of the atmosphere 3.The state's low and the transformation of the atmospheric gas; the airborn particles 4. The atmospheric diagrames 5.The radiation in the atmosphere 6.The water 7.The soil 8.The pollution and the atmospheric, water and soil pollution protection The content of the laboratory: 1.The scientific laboratory's norms 2.The atmospheric measurements – The Rainwise weather station 3. The atmospheric measurements – The Kestrel weather station 4.The measurement of the pH for polutant mixtures 5.The measurement of the airborn particles' concentrations and the measurement of the burnt gases' concentration 6.Laboratory exam	4
Agronomy	BA	Agriculture / Engineer	II	I	**PEDOLOGY I** **1.The object and role of pedology in the development of agricultural production:** The definition and object of the Pedology; Soil fertility; The short history of the development of the Pedology; The role of the Pedrology in the development of agricultural production; Situation **2. Solification factors:** Climate as a solification factor; The role of bodies; The role of rock in pedogenesis; The role of the terrain in soil formation; The role of groundwater and stagnant water; Time as a pedogenetic factor; Anthropogenic factor in solification processes; The combined activity of solification factors on the land soil of Romania. **3. Formation and composition of the mineral part of the soil:** Origin of the mineral part of the soil; The processes for forming the mineral part of the soil; Products resulting from the processes of disaggregation	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					and alteration; The transport and deposit of disaggregation and alteration products **4. Formation and composition of the organic part of the soil:** Sources and quantities of organic matter; Conversion of organic waste and formation of humus in soil; The classification and properties of humic acids; The main types of humus; Importance of humus in soil **5. Soil profile formation and composition:** Processes leading to deep soil differentiation; Pedogenic horizons and their characterization **6. Physical and physico-mechanical properties of the soil:** Soil texture; The structure of the soil; Other physical properties; Physical — mechanical qualities **7. Hydrophysical, aeration and thermal properties of the soil:** Water in the soil; Air in the ground; Soil temperature. **8. Soil chemical properties:** Soil solution; Soil colloids; Sorption processes in	
Agronomy	BA	Agriculture / Engineer	II	II	**PEDOLOGY II** **1.Soil classification:** Evolution of soil classifications; Current international classifications; The evolution of soil classifications in Romania; Land taxonomy in Romania; The natural framework for soils forming. **2.The Romanian soil taxonomy system:** Class: Protysoils; Cernisoils, Umbrysoils, Cambisoiles, Claysoils, Spodisoils, Vertisoils, Andisoils, Hidrisoils, Salsodisoils, Histisoils, Antrisoils. **3.Charting and subsidies on agricultural land:** Soil mapping; The characterisation of soil agricultural properties	5
Agronomy	BA	Agriculture / Engineer	II	I	**Plants physiology** I 1. Introduction to plant physiology. Definition, object, history, importance, Plant Physiology specific research methods. Plant physiology contribution of to the progress of agriculture 2. Plant cell physiology - Overall. Physiological functions of the cellular structural components. Physico-chemical and physiological properties of protoplasm. The basic phenomena of exchange of substances between the plant cell and the external environment - adsorption, imbibition, diffusion, osmosis.	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					3. Water regime of plant The physiological role of water. The water absorption by the plants through the root system. The mechanism of water absorption through the root. The influence of internal and external factors on water absorption. The water absorption through the aerial organs of the plants. The movement (driving) of water in the plants body. The removing water from the plants body (perspiration and guttation). The water balance of the plants. 4. Mineral nutrition of plants - Methods used in the study of nutrition. Specific physiological role of macro elements, microelements and ultra-microelements. - The absorption and circulation of the mineral elements in plants. The root as absorption organ. - Extra-root mineral absorption and movement of elements in plants. The physiological basis of fertilizers application. The circulation of the mineral elements in plants.	
Agronomy	BA	Agriculture / Engineer	II	II	**Plants physiology II** 1. Photosynthesis 2. Plant respiration 3. Transformation and circulation of organic substances in the body of plants 4. Plant growth 5. Resting state of plants 6. Plant movements 7. Individual development of plants 8. The physiology of plant resistance to adverse environmental conditions	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Agronomy	BA	Agriculture / Engineer	II	I	**Energy base and agricultural machinery II** Course content: Chapter 1. Machines for harvesting stale cereals. Grain maize harvesting machines. Sunflower harvesting machines. Chapter 3. Machines for harvesting fodder plants. Chapter 4. Potato harvesting machines. Beet harvesting machines.Chapter 5. Textile plant harvesting machines.Chapter 6. Machines for harvesting horticultural crops. Chapter 7. Installations for drying agricultural products. Machines and installations for the conditioning of agricultural products. Machines for transporting, loading and unloading agricultural products. Content of the seminar or practical work: L1- Study of machines for harvesting stale cereals. L2- Studying the machines for harvesting maize for grains.L3- Study of the machines for harvesting the sun flower.L4- Study of machines for harvesting fodder plants.L5- Study of potato harvesting machines. L6- Study of beet harvesting machines. L7- Study of machines for harvesting textile plants. L8- The study of the machines for harvesting horticultural crops.L9- Study of the installations for drying agricultural products.L10- Study of machines and installations for conditioning agricultural products.L11- Study of the machines for the transport, loading and unloading of agricultural products.	5
Agronomy	BA	Agriculture / Engineer	II	II	**AGROCHEMISTRY I** **1. Objectives and evolution of agrochemical:** The objective of agrochemical; Development of agrochemical concepts over time; Scientific laws used in agriculture; Current problems of Agrochemistry **2. Agrochemical bases of fertilization in relation to plant requirements:** Chemical composition of plants; The root absorption of the nutrients, agrochemistry. **3.Soil as a natural environment for plant nutrition and fertilizer application and amendments:** Soil phases and components; Soil quality in relation to plant fertility and nutrition. **4.Correction of soil reaction by amendment:** Plant requirements for	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					soil reaction; Correction of the acidic pH of soils; Correction of reaction and salt content in saline and alkaline soils. **5.Nutrient Agrochemicals:** Nitrogen Agrochemistry; Phosphorus Agrochemistry; The Agrochemistry of potassium	
Agronomy	BA	Agriculture / Engineer	II	I	**Entomology. The general part (course)** **-Entomology - agricultural science.** Definition and object of Entomology. Place of the discipline in the context of agronomic sciences. Losses caused by pests to agricultural crops History of entomology. Entomology development in Romania **-General characteristics of insects** Overview The external morphology of the insect body Skin. Its head and appendix. His chest and appendages His abdomen and appendages. **-Insect anatomy and physiology** Digestive system.Respiratory system.Circulatory system. The excretory system. The secretory system. Nervous system. 3.7. The sense organs in insects. Instincts in insects The reproductive system. Sexual dimorphism **-Insect biology** Sexual maturation. Insect breeding. Insect development. Embryonic development. Post-embryo development. Postmetabolic development. Generations and the biological cycle in insects. Diapause. **-Insect ecology**. Factors influencing the development of insects. Climatic factors. Edaphic factors. Biotic factors. Technical factors. Anthropogenic factors. **-damage caused by insects** Estimating damages **-Prognosis and warning in the fight against pests** Development of forecasts. Warning of treatments. **-General methods of prevention and control of pests** Phytosanitary quarantine. Agro-phytotechnical methods. Mechanical methods. Physical methods. Chemical methods. Biological methods. Integrated combat.	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Agronomy	BA	Agriculture / Engineer	II	II	**Entomology The special part (course** **-The main pests of cereal crops:** wheat thrips, green cereal aphid, green corn aphid, grain bedbugs, grain-filled bedbugs, hunched cockroach, firecracker beetles (wireworms), grain beetles, steppe beetles, western worm corn roots, corn leaf ladybug, Hesse fly, Swedish fly, wheat wasp, corn shearer, seed buha, field mouse. -**The main pests in meadows, pastures and natural meadows:** the Italian grasshopper, the Moroccan grasshopper, the grassland caterpillar. **-The main pests of annual fabaceas:** peas ladybug, bean ladybug, soy pod moth **-The main pests of the perean fabaceas**: the red beetle of alfalfa, the alfalfa ladybug, the ladybug of the alfalfa roots, the ladybug of the alfalfa leaves, the ladybug of the alfalfa seeds. **-The main pests of technical plant crops:** Beet black louse, beet leaf ladybug, beet grey ladybug, steppe caterpillar, beet nematode, Colorado beetle, May beetle, rapeseed beetle, red rapeseed beetle, rapeseed wasp, sunflower moth. **-The main pests in medicinal plants:,** coriander wasp. -**The main pests in vegetable crops:** european mole cricket, the gray cabbage aphid, the black cabbage fleas, the cabbage root beetle, cabbage stew beetle, cabbage seed beetle , cabbage white butterfly, cabbage buha, caterpillar fruits, cabbage fly, onion fly, white greenhouse mussel, gray cabbage aphid, cucumber aphid, broad mite, bulb nematode, the root nematode **-The main pests of the apple orchards:** turtle aphid from San José, woolly aphid, green apple aphid, gray plum aphid, green peach aphid, apple flower beetles, apple worms, plum worms, the hairy caterpillar of the mite, the eastern moth of the fruits, the wasp with the saw of the apples, the cherry fly, the red mite of the apple **-Main pests of vines:**	5

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					phylloxera of vines, the green moth of the grapes, the marbled beetle, the common red mite, the *Eryophies* mite of vines. **-Main pests of crops and stored foods:** flour worm, wheat bran, cereal moth, black beetle.	
Agronomy	BA	Agriculture / Engineer	II	II	**The experimental Technique** The content of the course: 1.Introduction:Elementary statistics, the gathering of the experimental data notiuni despre statistica,prelevarea datelor; 2.The space-distribution of the agricultural experiments 3.The polifactorial experiments 4. The theoretical base of the statistic's analyses 5.The analyse of the variance 6.The deviation from the theoretical model 7.The capitalization of the polyfactorial experiments 8. The capitalization of the experiments series The content of the seminar: the same structure as the course structure	3
Agronomy	BA	Agriculture / Engineer	II	I	**GENETIC** 1.introduction. Chromosomes.mitosis. Meiosis. 2.the rendering of qualitative characters - the rendering of independant characters. Linkage and cross over phenomena and the composition of chromosomal maps 3 the rendering of quantitative characters.genetic heterogeneity. Conangvinisation.heterosis.transsistic variation Genetic populations - frequency of allees. Factors that change the genetic structure of populations (selection, mutations, migration, genetic dropout). 5. Genetic heterogeneity of sexes- genetic mechanisms of sex determination. Genetic heterogeneity of sexes in plants.factors influencing the determinism of sexes. Sex-influenced characters. Genetic heterogeneity for control of reproduction in plants 6. Polyploidy, polyploidy complexes and evolution- Auopoliplovia. Alopoliplovia. Appearance of polyploidy in nature.Polyploidy artificiala.Pseudopoliploidia.Haploidia.Complexele polyploidy and evolution. Polyploidy to plants.aneuploidy.	5

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					7.chromosome restructurings- types of dislocations and their examination.changes in the number and sequence of genes. 8. The changes . Mutagenic factors. Improvement of natural and artificial organisms - changes. Chemical mutagenic factors.mutagenesis and plant improvement.	
Agronomy	BA	Agriculture / Engineer	II	I	**MICROBIOLOGY** **1.THE PURPOSE OF THE MICROBIOLOGIEI STUDY** selective data on the instinctive of microbiology. Romanian School of Microbiology 2**. THE GENERAL CHARACTER AND POSITION OF THE MICRO-ORGANISMS IN THE LIVING WORLD**. The position of the micro-organisms in the living world. The people. Viruses : morphology, structure, bacteriophagia, cyanaophagia. Bacteria: Morphology, structure, systematic, identification. The Cyanolacteries: Morphology, structure, role. Protozoa: Morphology, physiology, structure, role morphology diatoms , structure, role. Mushrooms : morphology, structure, multiplication, nutrition, systematic. **3. INFLUENCE OF ENVIRONMENTAL FACTORS ON MICRO-ORGANISMS.** Influence of pH, temperature, water, radiant energy.microbial activity of different soils. ECOLOGICAL INTERACTIONS BETWEEN ORGANISMS. Inter-relationships between populations of micro-organisms. Between higher plants and soil micro-organisms: Influence of the root system on soil microflora, micro-organisms, interrelationships between fungi and plants **5. SOIL AS AN EXISTING MEDIUM FOR MICRO-ORGANISMS**. Soil composition, reaction. Chemical composition, role of micro-organisms in the formation of matter. Soil population. **6. THE ROLE OF MICRO-ORGANISMS IN THE CIRCUIT OF THE MATTER IN NATURE**. Nitrogen circuit : fixation, ammonia, nitrification, denitrification. The circuit of carbon, sulfur, iron, phosphorus, potassium.microbial transformation of calcium, magnesium	3

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					and microelements. 7. THE BENEFICIAL ACTIVITIES OF MICRO-ORGANISMS. The activity of micro-organisms in herbivores, in fermentation, in biogas production, composting and in biological control of diseases, pests and weeds	
Agronomy	BA	Agriculture / Engineer	ii	ii	**Combating soil erosion** 1. Soil erosion - Introduction 2. The erosion process 3. Quantitative estimation of soil erosion. The universal equation of erosion 4. Prevention and control of soil erosion on agricultural land 5. Protective sunsets 6 .. Prevention and control of soil erosion in vineyards and orchards 7. Prevention and control of soil erosion on grasslands	4
Agronomy	BA	Agriculture / Engineer	III	I	**Phytotechnics I -** content 1. Introduction to phytotechnics - The object, object of study, research methods, the use of the land and the structure of crops. 2. The main factors (ecological and edaphic) that condition the agricultural production and the agricultural areas with interest for the cultivation of field plants 3. Biological factors that condition agricultural production, seed quality indices - genetic analysis, physical analysis, physiological analysis, phytosanitary status analysis 4. Cultivation of straw cereals The importance of culture. General morpho-anatomical characteristics. The biological characteristics of cereal species. Autumn wheat cultivation technology. Barley culture technology. Oat culture technology. Rye culture technology. The culture technology in triticale.	5
Agronomy	BA	Agriculture / Engineer	III	II	**Phytotechnics II -** content 1. Oil plant culture	5

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					Characteristics common to vegetable fat-producing plants: Sunflower; Rape; The Shark, the Sofranel; Oil flax 2. Textile plant culture Characteristics common to textile fiber producing plants Linen for fuior, Canepa, Cotton 3. Cultivation of plants producing tubers and roots Characteristics common to plants producing tubers and roots; Potato Sugar beet IV.Culture of specific industrial plants tobacco hops	
Agronomy	BA	Agriculture / Engineer	III	I	**AGROCHEMISTRY II** **5. Agrochemistry of nutrients: Agrochemistry** of secondary macroelements (sulfur, calcium, magnesium); Agrochemistry of micro nutrients (iron, manganese, zinc, copper, boron, molybdenum). **6. The use of a combination f the following processes:** Mixed fertilizers; Complex and mixed fertilizers with plant protection substances; Maintenance and preparation of chemical fertilizers before application; Natural organic fertilizers). **7. Control of soil fertility by agrochemical methods:** Soil analysis; Plant analysis; Experiences with fertilizers). **8. Basic principles of fertilizer application:** Application of fertilizers to field plants; Basic principles of fertilizer application in tree plantations; Principles for applying fertilizers to vineyards; The principles for applying fertilizers to vegetables. **9. Agricultural Pesticides:** General, Forms of conditioning of pesticides; Residual effects; Safety features; Description of the main pesticide groups. **10. Pollution of the environment through the misuse of chemicals in agriculture:** Pollution by pesticides; Nitrate pollution; Soil pollution as a result of the application of irrigation; Soil pollution by livestock products.	5
Agronomy	BA	Agriculture / Engineer	III	I	**Phytopathology. The general part (course)** **-Phytopathology - agricultural science** Definition and object of Phytopathology. Place of the discipline in the context of agronomic	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					sciences Development of Phytopathology worldwide and in Romania Socio-economic importance of the protection of cultivated plants against diseases **-General notions about plant diseases** Definition and classification of diseases, General symptoms of plant diseases, Etiology of diseases **-Infectious phytopathogenic agents.** Viruses and viruses, Phytopathogenic bacteria, Phytopathogenic fungi **-The stages of the pathogenesis of infectious diseases**. Infection Incubation. Modifications of plants undergoing pathogenesis**.** **-Epidemiology of parasitic diseases of plants.** Ways of transmission and dissemination of phytopathogenic agents. Factors involved in the outbreak and evolution of plant disease outbreaks **-Combating plant diseases.** General principles. Integrated control - modern conception of plant disease control. Legislative measures and phytosanitary quarantine. Cultural hygiene. Methods and physical-mechanical means of controlling plant diseases. Technological (agrofitotechnical) measures and methods of importance in the prevention and control of plant diseases. Biological measures to control plant diseases. Chemical control of plant diseases. Prognosis and warning in the fight against plant diseases.	
Agronomy	BA	Agriculture / Engineer	III	II	**Phytopathology The special part (course)** **-Cereal diseases.** The diseases of wheat and rye: banded mosaic, yellowing and pinching, flouring, fusariosis, rust, septoriosis, blighflying (*Ustilago*), common blight, dwarf blight, rye horn, etc. Barley diseases: Striped mosaic, yellowing and tapping, powdermildew, leaf splitting, reticular staining, barley rust, leaf burning, barley stubble. Oat diseases: bacterial burn, blights, crown rust and other diseases. Diseases of rice: helminthosporesis, burning of rice. Corn diseases: European mosaic, pink rot of stems and saplings, white flowering, corn blight, dry rot of saplings, ash spot of leaves, other	5

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					diseases. Diseases of sorghum and millet: bacterial burning of sorghum, blight of sorghum, blight of millet, other diseases in annual and perennial forage plants. **-Diseases of annual fabaceas.** Bean diseases: common mosaic, yellow mosaic, bacterial burn, anthracnose, gray mold, rust, other diseases. Pea diseases: mosaic, bacterial burn, mildew, powdermildew, anthracnose, rust. Soy diseases: mosaic, bacterial burn, mildew, **-Potato and beet diseases** Potato diseases: virosis, blackening of the base of the stem and soft rot of tubers, common scab, black scab, mildew, brown spot. Diseases of the beet: mosaic, rhizomania, rotten seedlings, mildew, heart rot, *Cercospora*, powdermildew, rust. **-Diseases of oily plants:** Sunflower diseases: mildew, white rot, gray rot, necrosis and strain of the stems, black spot, brown spot (septoriosis), rust, other diseases Soya diseases: mosaic, bacterial burn, mildew, white rot. Rape diseases: white rot, gray rot, black stain, other diseases. Castor (*Ricinus communis*) disease: bacterial staining, brown staining, gray rot. **-Diseases of textile and industrial plants** The diseases of the flax: flour, rust, anthracnose, septoriosis, fusillary aging. Tobacco diseases: mosaic, disease of bronze spots, wild fire, mana, other diseases. **-Main diseases in horticultural plants** Diseases of vegetable plants: bacterial and severe viruses in tomatoes and peppers, rotten seedlings, tomato mildew, tomato septoriosis, fungal strains in tomatoes, peppers, eggplants, bacterial soft rot and onion mildew, powdermildew, mildew and anthracnose of cucumber and hernia cabbage, white rot, bacterial rot on carrot, parsley, etc Diseases in fruit trees: cancer, bacterial fire, flouring, *Venturia* sp and	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					monilioosis in apples, hair and gut, plumpox and monilioosis in plum, cherry etc., blistering of leaves, powdermildew and sifting of leaves in peaches, other diseases. Diseases of vines: viruses, mildew, powdermildew, gray rot, anthracnose etc. Diseases of medicinal and aromatic plants diseases of artichoke, diseases of lavender, diseases of mint, diseases of coriander.	
Agronomy	BA	Agriculture / Engineer	III	I	**Horticultural technologies** - content 1. Introduction to horticultural technologies 2. The importance of fruit growing and classification of fruit species. The ecological requirements of fruit species 3. Production of pomolic planting material 4. Technology of setting up and maintaining apple orchards 5. The importance of viticulture and the relations of the vine with the environmental factors 6. Morphology and biology of vines 7. Production of vine planting material 8. Establishment and maintenance of vine plantations	5
Agronomy	BA	Agriculture / Engineer	III	II	**Horticultural technologies** - content 1. Introduction to horticultural technologies 2. The importance of fruit growing and classification of fruit species. The ecological requirements of fruit species 3. Production of pomolic planting material 4. Technology of setting up and maintaining apple orchards 5. The importance of viticulture and the relations of the vine with the environmental factors 6. Morphology and biology of vines 7. Production of vine planting material 8. Establishment and maintenance of vine plantations	3
Agronomy		Agriculture /	III	II	**Rural Economy**	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
	BA	Engineer			Knowledge and interpretation of the concept of rural space, rural activities, rural occupations. Understanding the methods of analysis of the rural area, the methods of analysing the rural disparities in Romania and the EU. Knowledge of successful projects in rural areas at the level of Romania and other EU Member States. students will carry out a project proposal with European funding for a PNDR funding measure as a practical activity.	
Agronomy	BA	Agriculture / Engineer	III	I	**Agrotechnic-** Agricultural technique (Introductory notions: the research objectives and methods of agrotechnics, agricultural and arable land; Vegetation factors: the plant life environment, the interaction between production and vegetation factors (light, heat, air, water); Soil biology: soil bacteria, actinomycetes, soil fungi, algae, protozoa, metazoans, soil enzymatic activity; Soil fertilization and methods of improving it; Soil works: technological processes that take place in the soil during agricultural work, classification of agricultural works, plowing, felling, deep digging, grape work, cultivator work, soil work with roller, milling work, combinator work, bed preparation germinating; Soil compaction; Soil working systems: conventional (classical) system, current soil working systems practiced in Romania, minimum works system; Sowing and crop care; Weeds in agricultural crops.).	3
Agronomy	BA	Agriculture / Engineer	III	II	**Agrotechnic** -Agricultural technique (Weed control methods: integrated weed control, herbicide classification, herbicide effects on the environment, herbicide application methods; Application of herbicides on agricultural crops; Basements: organization, rotation cycle, classification, soil register; Differentiated agrotechnics in the pedoclimatic areas of Romania; Differentiated agrotechnics on poorly productive soils; Agricultural systems.).	5
Agronomy	BA	Agriculture / Engineer	III	II	**Culture of medicinal and aromatic plants -** content 1. Brief History, the object and importance as an object of study; Active principles - definition and examples; Classification of medicinal plants	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					from the agronomic and pharmaceutical point of view, respectively, according to the organs used to extract the active substance: Radix, Rhizoma, Tubera, Folium, Herba, Flores, Semen and Varia; 2. The technology of cultivation of medicinal and aromatic plants by groups of plants depending on the portion of plant (organ) used in therapy; Notions and methodologies for harvesting, drying, conditioning and preserving medicinal plants; The main factors (ecological and edaphic) that condition the agricultural production and agricultural areas with interest for the cultivation of field plants. /4 hours; Biological factors that condition agricultural production, seed quality indices - genetic analysis, physical analysis, physiological analysis, phytosanitary status analysis 3. The cultivation technology of Achillea millefolium and Carum carvi 4. Cultivation technology Corinadrum sativum and Mentha piperita 5. Cultivation technology Ocimum basilicum and Calendula officinalis 6. Digitalis lanata cultivation technology and Foeniculum vulgare 7. Cultivation technology Lavandula angustifolia and Matricaria chamomilla 8. Cultivation technology of Papaver somniferum and Pimpinella anisum 9. Cultivation technology Rosmarinus officinalis and Salvia officinalis 10. Cultivation technology Majorana hortensis	
Agronomy	BA	Agriculture / Engineer	IV	I	**Phytotechnics II -** content 1.Culture of cereals Corn cultivation technology. Sorghum cultivation technology. Mill culture technology. Rice cultivation technology. Buckwheat culture. 2. Cultivation of legumes for grains The importance of culture. General morpho-anatomical characteristics. General biological features. Pea culture technology. Bean culture technology. Soybean culture technology. The technology of culture at high, lupine, corn, bark, peanuts, beans.	5
Agronomy		Agriculture /	IV	I	**Plant improvement I**	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
	BA	Engineer			*Contents:* Basic concepts. The purpose and importance of plant improvement. Theoretical bases of plant breeding and interdisciplinary links of plant breeding. Objectives for plant improvement. Brief history of plant improvement and achievements of plant improvement in Romania. The initial material used in plant improvement. Definition and importance of the initial material used in plant improvement. Forms of the initial material. Collection, study and conservation of the initial material. Origin centers of plants. Reproductive and breeding plant system and and their importance for plant improvement. The main concepts used in plant breeding. Amphimictic multiplication. Apomictic multiplication. The notions of individual, line, family, clone, somaclone, variety, commercial hybrid, cultivar, biotype, population. Conventional methods of plant improvement – Selection, Hybridization, Inbreeding, Mutagenesis, Polyploidy. Unconventional methods of plant improvement - Recombinant DNA technology, In vitro cultures, Somatic hybridization, Haploid.	
Agronomy	BA	Agriculture / Engineer	IV	II	**Plant improvement II** *Contents:* Improvement of autogame plants (wheat, barley, beans, soy, flax). Improvement of allogamous plants (corn, sorghum, rye, hemp, sunflower, sugar beet). Improvement of plants with vegetative breeding.	4
Agronomy	BA	Agriculture / Engineer			**Culture of meadows and fodder plants** – contents ; 1. The role and place of feed in the development of animal husbandry;The importance of ensuring the forage base. 2. Pastures and permanent grasslands 3. Vegetation of permanent grasslands - Perennial grasses – 4. Vegetation of permanent grasslands - Perennial legumes - 5. Vegetation of permanent grasslands - Species from other botanical families -	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					6. Improvement of permanent grasslands through surface works 7. Improvement of permanent grasslands through radical works Destruction; Establishment of temporary meadows 8. Rational use of permanent and temporary pastures through pasture - Principles of rational use of permanent and temporary pastures 9. Rational use of permanent and temporary grasslands through the meadow - Principles of rational use of permanent and temporary grasslands through mowing and mixing 10. Conservation of forages by their silage. Green conveyor. Isolation of forage crops	
Agronomy	BA	Agriculture / Engineer			**Culture of meadows and fodder plants** – contents ; 1. The culture technology of the annual grasses forage - cultivation of silage maize, green table and fan as well as mixed with other plants- sorghum culture;- Sudan grass culture;- oat culture 2. The culture technology of perennial grasses- Golum culture 3. Culture technology of perennial grasses- perennial ray crop 4. Culture technology of perennial grasses- the orchard pawn; . 5. Culture technology of perennial grasses - the red straw; 6. Culture technology of perennial grasses- unobtrusive obsiga; 7. The culture technology of perennial legumes - feed peas- autumn mazarich 8. Culture technology of perennial legumes- lupine 9. The culture technology of perennial legumes- crack 10. The culture technology of perennial legumes - the guide 11. Culture technology of perennial legumes - the red clover, 12. Culture technology of perennial legumes- the blue skylight,	5
Agronomy	BA	Agriculture / Engineer	IV	I	**Irrigation of crops** Course content: Chapter 1. Irrigation in agriculture. Soil properties in relation to water.	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Water balance (hydrological regime) in soil. Relationships between soil water and plant. Chapter 2. Irrigation water quality. The elements of the irrigation regime. Forecast and warning of watering in irrigation systems.Chapter 3. Irrigation techniques under special conditions. Agro-technical features of irrigated crops.Chapter 4. Irrigation of the main field crops. Irrigation of forage crops. Irrigation of rice culture. Irrigation of horticultural crops. Irrigation of crops with wastewater. Content of the seminar or practical work: L1- Methods and equipment used to determine soil moisture. Gravimetric and electrical determinations of soil moisture. Field and laboratory determinations L2- The hydrophysical properties of the soil. Determination of field capacity, wetting coefficient, soil water permeability, active humidity range, minimum ceiling. Groundwater intake. Field and laboratory determinations.L3- Water consumption of agricultural crops. Methods of calculating water consumption. Determination of water consumption of crops by the Thornthwaite method. Practical exercises L4- Hydrotechnical scheme of an irrigation system. L5-Types of arrangements and general schemes for arm lifting. Hydrotechnical scheme and arrangement of pipes buried in irrigation by sprinkler.L6-Diagram of the open channel drying system.L7-Hydraulic elements on channels (water speed, sections, flow rates, roughness). Sizing of channels in irrigation works	
Agronomy	BA	Agriculture / Engineer	IV	I	**General animal husbandry** - content 1. Introduction to the discipline of animal husbandry 2. General animal husbandry - Notions of general animal husbandry; Zootechnical systematics - The notion of species; Structure of the species; Species characters; The notion of race; Race characters; Breed classification; Individual characteristics of domestic animals; Constitution of domestic animals; Products of domestic animals; Animal breeding and development. 3. Assessment of the production capacity of the domestic animals after the outside, the Constitution and the conformation of the domestic	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					animals. 4. General elements regarding the composition of the living matter. 5. Reproduction of domestic animals 6. The digestion and feeding of domestic animals 7. Genetic improvement of the animal population. Natural selection and artificial selection - definition of selection. Types of artificial selection. 8. Genetics of animal populations - The object of study of genetics; Cellular elements with genetic role; Gen- Genotypes- Phenotypes; Segregation of genetic material; Changes in chromosome structure; Gene interaction phenomena; Population genetics - definition; Hardy-Weinberg Law; Factors that change the frequency of genes in a population; Gene background and genetic variability; Genetic populations and their evolution; Adaptation to the environment; Mechanisms of population isolation. 9. Pet Hygiene 10. Processing of products of animal origin. 11. Management of the breeding activity of domestic animals	
Agronomy	BA	Agriculture / Engineer	IV	II	**General animal husbandry -** content 1.. Technology of breeding bulls 2. Pig breeding technology 3. Technology of sheep breeding 4. Bird breeding technology 5. Horse breeding technology 6. Beekeeping technology 7. Fish breeding technology	3
Agronomy	BA	Agriculture / Engineer	IV	II	**Marketing** Knowledge of the specific marketing language and development of agro-marketing applications in the economic environment. There will be field activities, interviews, food market research, promotional campaigns. We also address young people passionate about studying and again in the agri-food field, who have the desire for improvement and progress in their activity, strengthening the connection and cooperation with the university environment. Students will present their projects to me	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					marketing applications, in an atmosphere of innovation, but also of holidays, with meticulously arranged stands, folk costumes, dances, surprises and unique moments.	
Agronomy	BA	Agriculture / Engineer	IV	I	**Management** Knowledge of the management language and development of students' abilities to manage plant and animal resources by applying a management program. Developing a management vision at the level of a vegetable and animal farm by applying modern methods of business management. Capacity development to design and to rationalize a decision-making system. Developing the capacity to design the economic results of the field data farms, for the efficient use of material, human, financial and information resources.	5
Agronomy	BA	Agriculture / Engineer	IV	II	**Conditioning and storage of agricultural products** Course content: Chapter 1. The importance of the conservation and preservation of the agricultural agricultural products. The quality traits of the seed mass. The physiological processes from the seed table during storage. Chapter 2. Methods of conservation of vegetable products. Chapter 3. Reception of vegetable agricultural products. Cleaning and sorting of agricultural products. Machines and installations used in the storage areas of agricultural products. Combating pests from landfills and agricultural products. Chapter 4. The milling technology. Technology of industrialization of vegetables and fruits. Technology of milk processing. The technology of producing grape products. The process of obtaining meat products. Content of the seminar or practical work: L1- General characteristics of agricultural products for the main species of cultivated plants. L2- Reception of agricultural products. L3- Determining the quality traits of the seed mass. L4- Constructions for the storage of plant agricultural products. L5- Grading of consumer seeds. L6- Establishing the average quality of agricultural products. L7- Perisibilities during the management of agricultural products. L8- Infestation of agricultural products and control measures. L9- Conditioning station - didactic visit.	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Environmental Engineering	**BA**	**Engineering of Biotechnical and Ecological Systems**	**III**	I	**The physics of atmosphere I** 1. The atmosphere composition. The atmosphere division. 2. The chemical components of the atmosphere. The gases of the Earth's atmosphere. 3. The atmospheric statics - fundamental laws. The air pressure variation depending on altitude. The air pressure variation at sea level 4. Thermodynamic processes in the atmosphere. The dry adiabatic temperature gradient. The potential temperature. The adiabatic transformation of unsaturated moist air 5. Moist adiabatic processes. Saturated moist adiabatic gradient. Entropy and potential temperature 6. The thermal radiation flux on the earth's surface and into atmosphere. The solar radiation. The radiation balance 7. The heat transfer in the atmosphere. Convective and turbulent heat transfer. The advective heat transfer	4
				II	**The physics of atmosphere II** 1. Thermal regime of the atmosphere. Temperature inversions in the atmosphere. The thermal balance 2. The water cycle in the earth-atmosphere system. Condensation of water vapor 3. Condensation nuclei. The clouds and fog. Liquid precipitation. The characteristics of rainfall. The snow. The physical characterization of the accumulation and melting process of the snow layer 5. Evapotranspiration. Potential and real evaporation	4
				II	**Ecotoxicology** 1. Introduction 2.Main range of toxique substances 3. Main sources of toxique substances 4. Effects of contamination with toxique substances 5. Mechanisms for the defense of organisms against chemical	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					pollution 6. Dispersion and concentration of pollutants In biomass 7. Factorii modificatori ai lanțurilor trofice 8. The action of harmful factors of a physical nature 9. The action of harmful factors of a chemical nature 10. the action of harmful factors of a biological nature. 11. Food additives 12. The influence of additives on the body food 13. Natural toxicity 14. Food nutrients with protective role in contamination with toxic substances.	
				I	**Mechanical Engineering Elements II** The first part presents the machine parts design basics, design methodology and the machine parts materials. In the following chapters there are presented the basics for fixed assemblies, removable assemblies, welded assemblies, rivet assemblies. There are also presented the basics for bearing. The all the above machine parts mentioned there are presented the function principle, efforts and all kind of resistance moments and the calculus methodology. In the following chapters there are presented the working principle, efforts and all kind of resistance moments and the calculus methodology for gears, shafts, belt drives, chain drives, spee variators, couplings, springs, sealings. At the end it is presented a sistemic design for a complex gearbox. The theoretical notions are demonstrated with practical works and a didactic project.	5
				II	**Climatology** 1.Introduction in climatology. Definition and object of study. Climate and climate. The branches of climatology; 2.Climate generating factors. Cosmic processes. Radiative-caloric	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					processes. Dynamic processes. Structure of the underlying active surface; 3.Climatic parameters. Air temperature. Humidity of the air. Atmospheric pressure. Atmospheric precipitation. Nebulosity; 4.Climate change factors. Physical-geographical factors (Landscape. Vegetation. Snow and ice layer). The anthropic factor; 5.Characteristics of climate zones and geographical types of climate of the globe. Hot climate area. Temperate climate zones. Cold climate zones. 6.Climatic variability. Climatic variations. Climatic risks. Climate change	
				I	**Automation of technologic and bio-technologic processes** Electrical measurement of non-electric parameters; Electric displacement convertes of temperature/mouvement/width/level/deformation/pressure/flow/speed/ moisture/vibrations/oscilations; Measurement instruments for temperature/pressure/flow.	4
				II	**Elements of electrochemistry and corrosion** I. Introduction 1.1. Classification of corrosion processes 1.2. Corrosion assessment methods II. Chemical corrosion III.The electrochemical corrosion IV. Protection of metals and alloys; anti-corrosion protection V. Preparation of surfaces for galvanic coating VI.Deposition of metals and others by galvanotechnical methods VII. Wastewater treatment from galvanic coating sections	4
				I	**Sourses of radiation and protection techniques I** Elements of the physics of nuclei;properties;The bending energy Energetical levels;nuclear forces;nuclear models Radioactivity;general properties;the radioactivity low Alpha,beta and gamma desintegration;application of the radioactive materials The interaction between ionizing radiation and matter	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					The measuring of the ionizing radiation;The Geiger-Muller counter;Methodes The cosmic radiation; the nuclear particles which compose the cosmic radiation The neutronic radiation Content of the seminar: Elements of the physics of nuclei;properties;The bending energy Energetical levels;nuclear forces;nuclear models Radioactivity;general properties;the radioactivity low Alpha,beta and gamma desintegration;application of the radioactive materials The interaction between ionizing radiation and matter The measuring of the ionizing radiation;The Geiger-Muller counter;Methodes The cosmic radiation; the nuclear particles which compose the cosmic radiation	
				II	**Sourses of radiation and protection techniques II** Radiation pollution's protection;water, soil and air radioactivity;atenuation and parcourse The screening of the radiation Dosimetry Profesional iradiation;contamination;biological effects Nuclear explosions ;radiological protection	4
				I	**Analysis and synthesis of technological processes I** 1. General notions. 2. Technological processes for the elaboration of semi-finished products. 3. Technological process of manufacturing by cutting trees in steps. 4. Technological process of manufacturing by cutting the shafts with several parallel axes. 5. Technological process of manufacturing by cutting cinnamon trees. 6. Technological process of manufacturing by cutting of the pieces and logs. 7. Technological process of manufacturing by cross-linking parts.	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					8. Technological process of manufacturing by carcassing. 9. Technological process of manufacturing by cutting the gears.	
				II	**Analysis and synthesis of technological processes II** 1. Technological processes for processing by cold plastic deformation. 2. Technological processes of assembly. 3. Technological processes of control. 4. Technological processes for unconventional processing. 5. Bio-mechanical technological processes. 6. Ecological technological processes.	3
				I	**Analiza sistemelor biotehnice/Analysis of Biotechnical Systems** 1. Biotope. Biocoenosis. Ecosystem - definition, classification. Ecological balance of ecosystems. 2. Types of ecosystems. The structure and functions of ecosystems. Dynamics and interaction between ecosystem components. 3. Complex ecosystems (biomes). Aquatic biomes. Terrestrial biomes. 4. Chemical pollution of ecosystems 5. The management, conservation and protection of natural resources and the environment 6. Biomass - the alternative resource for energy. Technologies for obtaining biofuels 7. Analysis of climatic factors in ecosystems	3
				II	**Practical Training** 1. Waste water. Introductory notions. Water pollution and sources of pollution. Categories of wastewater. Waste water evacuation and legislative regulations. Quality indicators and quality monitoring of wastewater 2. Wastewater treatment. Description of the technological process for wastewater treatment. The constructive principle of a treatment plant. Mechanical purification. . Chemical treatment. Biological treatment. Tertiary treatment. Treatment of sludge resulting from wastewater treatment. 3. Case study on wastewater monitoring at the Braila treatment plant. Constructive principle and description of the treatment plant. Qualitative analysis of wastewater. Nature of pollutants present in	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					wastewater Quality indicators characterizing wastewater. Quality conditions and methods general for wastewater analysis. Monitoring of wastewater quality in the Brăila. Description of sludge treatment processes in the Brăila treatment plant. 4. Visits at the wastewater treatment plant in Braila 5. Recycling and landfill. Waste transport. Waste neutralization. Ecological solution for soil protection. 6. Visit to the landfill.	
				I	**Technologies for the acquisition, monitoring and diagnosis of environmental quality** 1. Data acquisition systems. Signals, Sensors 2. Analog-to-digital conversion. Resolution and accuracy 3. Data collection theory. Economy through multiplex system 4. Electrical measurements. Data presentation 5. Statistical indicators. 6. Generation of measurement errors 7. Histograms, partition functions 8. Gaussian distribution of errors. The method of the smallest squares 9. Data approximation 10. Signal processing, Amplification, Filtration, Mitigation, Isolation, Linearization 11. Temperature measurement, Thermocouple, Thermistor 12. Noise reduction 13. Data archiving 14.Advanced methods Signals, Sensors, Data acquisition systems	3
				I	**Integrated waste management I** 1. Introduction to Integrated Waste Management. Definition of the concept of waste. Principles of waste management. 2. Current Waste Issues. Waste - a Global Problem. Waste Indicators. 3. Legislative framework and responsibilities on waste management. European and national waste management policies. Waste management plans and strategies. 4. Sources and categories of waste. Categories of waste and the	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					sources that generate it. Household waste; industrial waste; agri-food waste. 5. Management of municipal household waste in Romania. Selective collection. Transport of waste. Recovery and recycling. 6. Industrial waste management in Romania. Mining waste dumps and technological plant. Decanting ponds. Management of waste and residues in the mining industry. 7. Waste management responsibilities and obligations. Responsibilities. Obligations. 8. Analysis of the waste management sector. SWOT analysis. Application of SWOT analysis in management of the municipal solid waste sector. 9. Waste management systems. Introduction. Traditional waste management system. Integrated waste management system. 10. Waste collection. Introduction. Collection of recyclable waste. 11. Waste transport. Introduction. Transport systems.	
				II	**Integrated waste management II** 1. Law 211/2011 on waste regime. 2. Waste Characterization. Physico-Chemical Characteristics. Geotechnical Indices. Mechanical Properties. Waste Structure. 3. Waste treatment. Mechanical treatment techniques. Methods of biological treatment. Methods of mecani-biological treatment. Methods of heat treatment. 4. Harnessing biodegradable waste by composting. Decomposition processes during composting. Main factors for determining decomposition processes. Equipment used in compost plants. Methods of ex traction ferrous materials. 5. Waste recycling. Introduction. Recycling of municipal waste materials. 6. Ecological storage of household waste. Location and structure conditions. Operation of a controlled landfill. Water infiltrations and exinstallations. Biogas production and collection. Closure of landfills. Monitoring post-closure and ecological reconstruction of the area affected by waste storage.	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					7. Waste Storage through Power Pack technology. Storage of waste with Power Pack Technology. Advantages of Technology. Packaging Line. 8. Economic elements in waste management. Economic instruments. Costs in waste management. 9. European integrated waste management models.	
Environmental Engineering	**BA**	**Engineering of Biotechnical and Ecological Systems**	**IV**	I	**Sourses of radiation and protection techniques** Elements of the physics of nuclei;properties;The bending energy Energetical levels;nuclear forces;nuclear models Radioactivity;general properties;the radioactivity low Alpha,beta and gamma desintegration;application of the radioactive materials The interaction between ionizing radiation and matter The measuring of the ionizing radiation;The Geiger-Muller counter;Methodes The cosmic radiation; the nuclear particles which compose the cosmic radiation The neutronic radiation	4
				II	**Sourses of radiation and protection techniques** Radiation pollution's protection;water, soil and air radioactivity;atenuation and parcourse The screening of the radiation Dosimetry Profesional iradiation;contamination;biological effects Nuclear explosions ;radiological protection	4
				I	**Technologies and equipment for waters protection and purification** 1.Water pollution. General aspects 2.The importance of water/wastewater quality. Pollution assessment indicators. Analysis methods and legislative regulations for water quality assessment. 3. Unitary processes for wastewaters treatment (Physical, Chemical and Biological processes)	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					4. Specific wastewaters treatment procedures, installations and equipment. Technologies and Equipment for physical and physico-chemical wastewater treatment.	
				II	**Technologies and equipment for waters protection and purification** 1.Biological processes for wastewater treatment 2. Advanced wastewaters treatment processes 3. Unitary processes for the treatment of sludge from wastewater treatment plants	4
				II	**Ecotoxicology** I.Introduction to ecotoxicology II. Main categories of toxic substances III. Main categories of toxic substances IV Effects of contamination by toxic substances V. Mechanisms for protecting organisms against chemical pollution VI The dispersion and concentration of pollutants in biomass VII. Drivers of food chains VIII. The action of physical harmful factors IX The action of chemical harmful factors X The action of biological harmful factors XI:Food additives XII. Influence of food additives on the body XIII. Natural toxicity XIV. Food nutrients protecting against toxic substances	4
				II	**Elaboration of the diploma project** 1. Generalities regarding the diploma project 2. The content of a diploma paper 2.1 The presentation of the field of work 2.2 The current state of the researched field 2.3 The purpose of the study 2.4 The requirements and objectives of the project 2.5.Presentation of the assembly, equipment or system and the components that define the subject of the diploma project 2.6. Case study, tests 2.7.Conclusions	2

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					3. Content presentation 4. Graphics, exposure, presentation 5. Conduct and structure of the presentation 6. Criteria for appreciation of the diploma project 7. Structural recommendations 8. Appendix	
				I	**Technologies for treatment, neutralization and preservation of polluting** 1.Classification of polluting substances 1. 1. Classification (on the basis of physico-chemical properties) 1. 2. Classification (on the basis of toxicological properties) 1. 3. Classification on the basis of effects on human health 1. 4. Classification according to environmental effects 2. Nomenclature and labeling of polluting substances 3. Warning systems [n handling polluting substances 3. 1. Symbols and indications of danger for dangerous chemical substances and preparations 3. 2. The nature of the particular risks attributed to chemical substances and dangerous preparations 4. Methods for the treatment of polluting substances 5.Methods for neutralizing polluting substances 6.Methods for the preservation of polluting substances 7. Regulations concerning the treatment, neutralization and preservation of polluting substances.	4
				II	**Hydraulics** - Physical and analytical definition of flow regimes; Reynolds' experience; Physical and analytical definition of laminar and turbulent regimes. - Bernoulli's equation for the permanent motion of incompressible fluids in the gravitational field; Hydraulic, piezometric and geometric slope. - Calculation of flow and average speed per section; Distribution of viscous friction effort. - Permanent flow through cylindrical pipes under pressure; The effluent flows through the holes.	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					- Calculation of flow in open channels and over spills. - Water supplies; Water sources and captures; Water treatment, transport and storage. - Watercourses; The sewerage network; Sewage of domestic, industrial and meteoric waste water. - Wastewater treatment; Operating principles; General schemes.	
				I	**Ecological management** 1. Management of the environment 2. Structure of ISO14000 series standards 3. Integration of the environmental management system with other management systems 4. Tools and methods used in environmental management 5. Monitoring the environment 6. Integrated Pollution Prevention and Control directive and definition of Best Available Techincs 7. Model of integrated environmental control 8. Regulations regarding the assessment of environmental pollution 9. Large combustion plants 10. Final conclusions	4
				I	**Biotechnological exploitation of natural resources** 1. Evaluation and distribution of natural resources. The Atmospheric resources. The Lithosphere resources. The hydrosphere resources. The Biosphere resources 2. The rational exploitation of natural resources. The physico-chemical methods of polluted soils remediation. Plant-Assisted Bioremediation In Soil	2
				II	**Biotechnological exploitation of natural resources** 1. The soil protection from erosion. The natural factors causing soil erosion. Prevention and control of soil erosion 2. Sustainable exploitation of forest ecosystems. Management of forest ecosystems 3. The bioremediation of waters and soils. The groundwater treatment biotechnologies. On-site biological treatments. Ex situ biological treatments	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
				I	**Diagnosis of environmental quality I** 1. Evolution of concerns regarding environmental protection, in relation to sustainable development 2. National and regional systems for promoting ecological products and processes 3. National systems for ecological marking of products; Concerns in the European Union regarding the introduction of a unitary eco-marking system for products; Community environmental management and audit system; The stages of the implementation of the community environmental management system. 4. Environmental management according to ISO standards 14000 series Overview of standards; Historical landmarks regarding the elaboration of ISO 14000 standards; ISO14000 standards regarding environmental management systems; ISO 14000 standards regarding environmental aspects of products and services; Implementation of an environmental management system according to ISO 14001 standard; 5. Defining the environmental policy of the organization; Planning the environmental objectives and the necessary resources; Implementation of programs and ensuring the functioning of the environmental management system; Verifying the application of the programs and evaluating the results obtained; 6. Audit of the environmental management system; Analysis of the environmental management system. 7. The relationship between the community environmental management and audit system, ISO 14000 and ISO 9000 / The current state of concerns regarding the implementation of an environmental management system; Concerns regarding the harmonization of the community environment management and audit system with ISO 14000 standards; 8. Approaching the ISO 14000 and ISO 9000 standards within an integrated quality-environment management system. Tools of environmental policy 9. Systems of means and tools used in environmental protection policies;	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					10. Means and tools for implementing environmental policies; Possibilities for improving the economic instruments used worldwide; 11. Environmental protection instruments in the European Union 12. The basic principle "who pollutes pays". Advantages and limitations; 13. Types of environmental protection tools. A new approach to environmental protection in the context of sustainable economic development 14. Distortions of the social evaluation of resources and pollution	
				II	**Diagnosis of environmental quality II** 1. Pollution and use of resources 2. Conservation of biodiversity. Environmental legislation in the field of biodiversity conservation. 3. Conservation of biodiversity at national level. World strategy for nature conservation 4. Methodologies for promoting environmental engineering projects. General problems; Contents of prefeasibility studies; Content of feasibility studies. 5. Ecological impact assessments. General aspects. Components and indicators of impact assessment studies; Methods and techniques for assessing the ecological impact	4
				II	**Protection at the Pollution by Vibration** *The main objective of the course:* acquiring the principles, concepts and engineering skills necessary to understand and describe the phenomena, processes, principles and methods of combating pollution through vibration. *The following topics are included:* 1.Elements of mechanical vibration theory. 2.General problems on machine foundations and vibration isolation of machines and equipment 3.Vibration isolation elements and systems 4.Calculation and construction of machine foundations and vibration insulation systems 5.The influence of vibration on the human body and on the performance	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					level of the machines and equipment	
				II	**Transfer phenomena and unitary operations** Dimensional analysis, similarity, modeling, terminology, parameters and graphs of calculation. Transfer phenomena. Methods of study The transfer of movement quantity Heat transfer Transfer of matter quantity	3
				I	**Protection against pollution caused by heat engines** 1. Understanding the operations of internal combustion engines and how they produce environmental pollution. 2. Understanding the operating cycle of internal combustion engines and highlighting processes that influence pollution in the environment. 3.The influence of the organology on the polluting emissions. Knowledge of the functioning of engine systems and their influence on pollutant emissions. Active measures to combat pollution caused by engines. 4. Legislation and rules related to pollution caused by engines. 5. Classic and alternative fuels	4
				I	**Soil science** I. Introduction. The general characteristics of the soil. Soil fertility. Evolution of soil knowledge. II. Soil formation. Soil factors: Living organisms, parental rock, climate, relief, static groundwater, time, man. III) Soil composition.solid phase: Minerals and humus. Liquid phase: So solution. Gas phase: Special features of the air in the ground. IV The physical properties of the soil. Particle size composition. Structur Specific weight. The bulk density. The trick. Hydrophysical indices, wat regime in soil. Mechanical properties of the soil. Thermal properties of th soil. V. Soil chemical properties. Elements of colloidal chemistry.reaction. To cationic and anionic exchange capacity. Degree of saturation with bases. The sum of the changeable bases. Hydroolytic acidity.buffering capacity. Total content of soluble salts. Nutrient content.	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semes ter	Course title and brief description	Credit units
					VI Soil classification in the world and in Romania. The soil Oriyonts. The composition of the soil profile. FAO classification. American classification. Russian classification. Classification of INCPA Bucharest. VII.Rehabilitation of soil degradation pedogenically or anthropic.Melioration of acidic soils. Improvement of salt soils. Improvement of soil with excess moisture. Improvement of sandy soils. Improved fertilization.	

Study domain	Level (BA/MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Engineering and Management	**BA**	**Economic Engineering in the Mechanical Domain**	**1**	**1**	**Mathematical Analysis** Series of real numbers. Sequences and series of real functions. Power series. Taylor series. Functions of several real variables. Limits. Continuity. Partial derivatives of I and II order. Differentials of I and II order. Extreme values of functions of several real variables. Constrained extrema and Lagrange multipliers. Improper integrals. Euler integrals. Scalar and vector line integrals. Applications of line integrals in mechanics. Double integrals. Applications of double integrals in mechanics. Triple integrals. Applications of triple integrals in mechanics. First order differential equations.	5
					Applied Informatics I Components and operation of the computer; Operating systems; Classification of operating systems; MS DOS (Disk Operating System) operating system; Comparison of Windows operating system versions; The Windows operating system; Processors of texts: Microsoft Word; Notions of editing; Word screen elements; Basic commands and operations; Formatting the text; Working with tables; Menus; Working with long documents (creating the table of contents, creating an index); The equation editor; Efficient use of Word; Fragmentation the text into sections.	5
					Descriptive Geometry The representation of the point and the straight line into the triple orthogonal projection (available notations and conventions, the point	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					into a triple orthogonal projection, the straight line in space and draught representation, the line traces, the particular positions of a line related to the projection planes, the relative positions of two lines on space); The representation of the plane through the elements that define it (including methods and techniques of plane defining, the plane traces, the line and point including by a plane, the relative positions of a line related to a plane, the relative position of a two plane, the intersection of a line with a plane); The view methods in descriptive geometry (including the basics of visibility, the plane changing method, the rotation method, the folding method); The representation of the bodies limited by polyhedral surfaces (including the representation of the prism and the pyramid, the plane sections into prisms and pyramids, the straight line intersection with a psim and a pyramid, the deployment of the prism and pyramid); Intersections of polyhedral bodies (including the mobile method to evaluation the polygonal line of intersection, the evaluation of the polygonal line of two pyramids intersection)	
					Chemistry The structure of atom. Subatomic particles. The periodic system of the elements. Chemical bonds. Chemical reactions. Aggregation states of matter. Calculation elements in chemistry. Acids and bases. Ionic balances. The chemistry of chemical elements and compounds.	3
					Physics Elements of classical mechanics. Mechanical oscillations and waves. Ideal gas. Fundamental notions of thermodynamics. Calorimetry. Elements of statics and fluid dynamics. Electrostatics. Electrocinetics. Magnetostatics.	4
					Materials science and engineering Introduction, brief history. Nature and structure of metals, real crystals. Phases and constituents in alloy systems. Balance diagrams. Solidification of metals and alloys. Methods of investigation of the metallic state, investigation of the structure. Testing of metals. Fe-C alloys used in industry. Non-ferrous metals and alloys. Thermal processing of metals. News in the field.	5
					Physical Education I	1

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Presenation of a minimal theoretical content aimed at the physical education activity. .Consolidation of the main processes in fotbal-boys and voleyball-girls,known from previous cycles.	
					English I *Production*. Specialized vocabulary and discourse situations. Grammar in focus: Present tenses (present simple, present continuous, present perfect) *Research and Development*. Specialized vocabulary and discourse situations. Grammar in focus: Past tenses (past simple, past continuous, past perfect) *Information Technology*. Specialized vocabulary and discourse situations. Grammar in focus: Future forms *Logistics*. Specialized vocabulary and discourse situations. Grammar in focus: Conditionals. *Quality*. Specialized vocabulary and discourse situations. Grammar in focus: Verb phrases *Health and Safety*. Specialized vocabulary and discourse situations. Grammar in focus: Verb phrases	2
				2	**Linear Algebra, Analytic and Differential Geometry** Vector spaces. Subspaces. Operations with subspaces. Linearly independent and dependent vectors. System of generators of a vector space. Basis of a vector space. Change of a basis of a vectorial space. Substitution lemma. Gauss-Jordan method. Applications of Gauss-Jordan method. Euclidean vector spaces. Orthogonal and orthonormal bases. Gramm-Schmidt process. Linear applications. Linear forms. Bilinear forms. Quadratic forms. Jacobi and Gauss methods of reducing a quadratic form. Scalar, cross and mixed products of vectors. Plane in space. Line in space. Quadrics. Sphere. Surface of rotation, cylindrical and conical surfaces. Curves. Tangent line to a curve. Frenet trihedron. Curvature and torsion of a curve. Surfaces. Tangent plane and normal line to a surface. Orientation of a surface. Curve on a surface. First and second fundamental forms of a surface. Total and mean curvatures of a surface.	4
					Applied informatics II Microsoft Excel (Opening a register; Formats in the workspace; Table	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					calculation; Inserting objects into the workspace; Editing calculation formulas; Data operations; Create a chart using the Chart Wizard application; Page formatting; View; Printing of files); Microsoft Powerpoint (General presentation; Basic concepts; Creating a presentation; Slide viewing; Creating a new slide; Creating abstracts; Effects applied to slides; The transition between slides); Data compression. Archiving programs Usefulness of the Internet, WorldWideWeb; Microsoft outlook.	
					Technical Drawing and Infographic I The representation in orthogonal projection of the pieces. Dimensioning of technical drawings. Representation, dimensioning and scoring of threads. Representation and dimension of the flanges. Axonometric representations. Notation of surface condition and dimensional accuracy. Representation of removable and non-removable assemblies. Making of the overall drawing.	5
					Numerical Methods Basics of numerical versus symbolical calculus, Datum interpolation, extrapolation and regression, Evaluation of the extreme values for numerical/analytical functions, Solving the algebraic equations and systems of algebraic equations, Numerical derivatives, Numerical integrations, Solving the Ordinary Differential Equations (ODE) and systems of ODEs, Solving the Partial Derivative Equations (PDE).	5
					Mechanics I Introduction to Newtonian mechanics. Introduction to static. Free material point statics. Static of the material point subject to connections. Links. Rigid statics. Notions. Reduction of any forces. Particular forces systems. Reduction of particular forces. Mass centers. Static moments. The balance of the rigid free and subject to ideal connections. The balance of the rigid subject to real connections. Static material systems. Points and rigid. Static articulated bar systems. Beams with lattices. Static filiform systems. Wire configuration. The applications of static in mechanical engineering.	5
					Physical Education II Settling in atack and defense game sistems.Billateral	2

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					games.Development of the elements of coordinative capacity: rhythm, precision, combination of movements, ambydextry, agility.Educate the general force on the upper, lower limbs, abdomen and trunk by the method of working in the circuit an by working on workshops.	
					English II *Engineering*. Specialized vocabulary and discourse situations. Grammar in focus: Active vs. Passive. Relative clauses *Automotive*. Specialized vocabulary and discourse situations. Grammar in focus: Causation *Metallurgy*. Specialized vocabulary and discourse situations. Grammar in focus: Obligation and requirements *Welding*. Specialized vocabulary and discourse situations. Grammar in focus: Cause and effect *Construction*. Specialized vocabulary and discourse situations. Grammar in focus: Ability and inability	2
					The Basis of the Economy Political economy. Streams of economic thinking. The national economy and its components. The economic activity. Production possibilities curve. The market economy system. Demand and supply. Economic fluctuations. Balance and imbalance in the economy. Economic cycles. Labor market. Demand and job offer. Employment and unemployment. Money market. Inflation. Capital market. Currency market. Technical progress. Work productivity. Profit. Sustainable economic growth and development.	5
			3	**5**	**Mechanisms and Machine Parts II** The first part presents the machine parts design basics, design methodology and the machine parts materials. In the following chapters there are presented the basics for fixed assemblies, removable assemblies, welded assemblies, rivet assemblies. There are also presented the basics for bearing. The all the above machine parts mentioned there are presented the function principle, efforts and all kind of resistance moments and the calculus methodology. In the following chapters there are presented the working principle, efforts and all kind of resistance moments and the	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					calculus methodology for gears, shafts, belt drives, chain drives, spee variators, couplings, springs, sealings. At the end it is presented a sistemic design for a complex gearbox. The theoretical notions are demonstrated with practical works and a didactic project.	
					Fluid Mechanics and Hydraulic Equipments II Applications of Bernoulli's law; Fluid flow rate measurement; Calculation of flow through orifices; Real fluids motion; Flow regimes; Hydraulic load losses; Bernoulli's law for viscous fluids; The real fluid flow through the orifices; Permanent flow through pipes; Non-permanent movement through pressure pipes; Fluid hammer phenomenon; Operation and construction of fluid flow control devices; Construction and operation of adjustable fluid flow regulators; Hydraulic fluid distribution, steering and sealing equipment; Adjustment equipments used for fluid flow rate control; Operation and construction of fluid filtration equipment; Energy storage devices by means of fluids; Auxiliary measuring and maintenance tools; Pressure measurement; Notification and hydraulic control function of fluid pressure; Temperature measurement; Measurement of circulating fluid flow rate. Measurement and control of liquid level.	4
					Fundamentals of Management The programme creates an overview and understanding of traditional management, its philosophy and role in society, knowledge of models for analysis and control of the management function in a company.The course covers basic concepts. It includes definitions, examples and practices.	3
					Lifting and Transporting Machines Dynamics Lifting and transporting mechanisms. The over time role of lifting and transporting machines in the industry. Flexible parts for lifting and transporting machines**.** Winding and conducting parts**.** Lifting and load moving mechanisms**.** Load grasping parts**.** Travel mechanisms. Lifting machines**.** Fixed tower cranes. Elevators**.** Transporting machines**.** Conveyor belts**.** Bucket elevators	4
					Electrotechnics and Electrical Machines Fundamental of Electrotechnics; Laws of Electrotechincs; Electric	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					field; DC&AC electrical circuits; Laws of electromagnetic field; Electrical transformer : equations, equivalent schemes, phasorial diagrames, operating mode ; Asynchronous machine : equations, equivalent schemes, phasorial diagrames, operating mode ; DC electrical machines : equations, equivalent schemes, phasorial diagrames, operating mode.	
					Ergonomics *The main objective of the course:* acquiring of knowledge and notions of the physiology and the medicine of the work and of the psychology and sociology, necessary for the study of the human factors of in the work process, in order to maintain the capacity of work to a maximum level during all the workshif, in ordert and to achieve the demanded performances. *Course contents:* 1.Introduction to the study of ergonomics; 2.Process of working in the enterprise; 3.The human-machine-environment system; 4.Ergonomic requirements of the human subsystem; 5. Ergonomics of the workplace;	3
					Machines for Industrial Processes *The main objective of the course:* acquiring the knowledge and skills necessary for the calculation, design, execution and operation, as well as the analysis and diagnosis of the technological machines for industrial processes. *Course contents:* 1.Introduction; 2.Machine drive systems for industrial processes; 3.Technological elements of the grinding processes of the aggregates; 4.Machinery and equipment for grinding aggregates. Vibrating mills; 5.Functional characteristics of vibrating mills; 6.Calculation of vibrating mills; 7. Dynamic models of new types of vibrating mill construction.	4
					Machine Tools Theoretical generation of surfaces. Generation of real surfaces on machine tools. Cinematic chains. Specific mechanisms widely used in the kinematic chains of machine tools. Calculation of the transmission ratio. Mechanisms for adjusting the main kinematic chains. Mechanisms for adjusting the kinematic feed chains. Elements of the	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					cutting tool. Lathe. Universal milling machine. Drilling, slotting, broaching machines. Gear machines. Grinding machines.	
				6	**Machines and Technological Equipment for Constructions** The process of excavating the soil. Bulldozers and scarifiers. Front loaders with a bucket. Excavators with a bucket. Excavators with telescopic boom. Excavators with multibuckets. Self-feeders. Compactors. Scrapers	3
					Economic Analises, Strategies and Forecasting The main purpose of the programme is to provide analytical support to the industry, in particular to the SMEs development and efficiency economis strategies implementation. The tasks under this course are becoming more complex and almost as sophisticated and dynamic as the globalised economic system all over the world is. It includes definitions, examples and practices. (Syllabus is referring to:Revenue and expenditure budget, Structural profit analysis, Rate of Return ROR, Internal Rate of Return – IRR, Average Rate of Return on Iinvestments, RIR based diagnostic analysis)	3
					Financial and Economic Analysis The programme focused on* the principles of project costing, organizing costs, cost benefit and financial analysis. All of the above being based on the accounting documents (balance sheet). The course includes definitions, examples and exercises. *estimates the net-benefits of a project investment based on the difference between the with-project and the without-project situations; *compares benefits and costs to the enterprise; *comparse the benefits and costs ; *checks the balance of investment and the sustainability of project, uses economic price that is converted from the market price by excluding tax, profit, subsidyt to measure the legitimacy of using resources.	3
					Computer Assisted Design I Introductory course. Commands for generating sketches. Editing commands for sketches. Commands for generating and editing curves. Surface generation and editing commands. Solid generation commands.	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Solid editing controls. Import / Export Files. Assembly of parts. Making execution drawings. drawing of the entire assembly.	
					Human Resources Management Challenges and content of human resources management; Employee motivation; Working groups. Work satisfaction; The social system of enterprises. Organizational culture; Design, analysis and evaluation of positions; Predictive management of employees.Employee career management; Remuneration management; The social balance; Organization of human resources management activity; Human resources and creativity; Social dialogue in the company; Comparative aspects and trends in human resources management.	3
					Marketing I The programme focused on students improving their ability to make effective marketing decisions. Through a combination of interactive discussions, cases, practical examples, individual assignments, and a group project(applied research surveys), students gain significant experience in communicating their marketing recommendations including assessing marketing opportunities and developing marketing strategies and implementation plans.	3
					Investment Management The programme ”Investment management” includes criterias for devising a short- or long-term strategy for acquiring and disposing of portfolio holdings.The course also includes chapters about tax services and duties, as well refers to the handling of assets and investments.	3
					Specialized Practice Labor protection training, knowledge of the sectors of the company S.C.Promex S.A. and the organizational chart of the company. Machine tools mechanical processing and technological operations for: turning operation, milling operation, drilling operation, slotting and planing, brochure operation, cylindrical and conical gears, flat grinding operation, cylindrical grinding operation, operation of grinding cylindrical wheels and conical wheels with curved teeth. Technical quality control for mechanical processing. Manufacturing process, "film" sheet for: shaft type parts, bush parts, gear wheels, welded	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					construction parts, complex parts. Normation of mechanical processing operations. Hydraulic, pneumatic installations. Normation of the operations for the execution of the hydraulic installations. General assembly of machines. Inquery-offer documentation. Specific management of the construction site. The balance sheet. Closing the activity and granting the qualification.	
					Law Introduction; the concept of law; the law configuration factors. typology of law; the law and the state; the principles of law; the functions of law; law in the social; normative system; the legal norm; the springs of law; the technique of elaborating normative acts; realization of the right; interpretation of legal norms; the legal report; legal liability; the system of law	4

Study domain	Level (BA/MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Mechanical Engineering	**BA**	**Machines and installations for agriculture and food industry**	**1**	**1**	**Mathematical analysis** Series of real numbers. Sequences and series of real functions. Power series. Taylor series. Functions of several real variables. Limits. Continuity. Partial derivatives of I and II order. Differentials of I and II order. Extreme values of functions of several real variables. Constrained extrema and Lagrange multipliers. Improper integrals. Euler integrals. Scalar and vector line integrals. Applications of line integrals in mechanics. Double integrals. Applications of double integrals in mechanics. Triple integrals. Applications of triple integrals in mechanics. First order differential equations.	5
					Applied informatics I Components and operation of the computer; Operating systems; Classification of operating systems; MS DOS (Disk Operating System) operating system; Comparison of Windows operating system versions; The Windows operating system; Processors of texts: Microsoft Word; Notions of editing; Word screen elements; Basic commands and operations; Formatting the text; Working with tables; Menus; Working with long documents	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					(creating the table of contents, creating an index); The equation editor; Efficient use of Word; Fragmentation the text into sections.	
					Descriptive Geometry *The main objective of the course*: Acquiring the knowledge necessary to reasoning the spatial relations with the view of transposing them into the bi-dimensional projection system, and to use the bi-dimensional representation tools for basic geometrical elements like point, straight line, plane, surface, and body. *The following topics are included*: The representation of the point and the straight line into the triple orthogonal projection (available notations and conventions, the point into a triple orthogonal projection, the straight line in space and draught representation, the line traces, the particular positions of a line related to the projection planes, the relative positions of two lines on space); The representation of the plane through the elements that define it (including methods and techniques of plane defining, the plane traces, the line and point including by a plane, the relative positions of a line related to a plane, the relative position of a two plane, the intersection of a line with a plane); The view methods in descriptive geometry (including the basics of visibility, the plane changing method, the rotation method, the folding method); The representation of the bodies limited by polyhedral surfaces (including the representation of the prism and the pyramid, the plane sections into prisms and pyramids, the straight line intersection with a prism and a pyramid, the deployment of the prism and pyramid); Intersections of polyhedral bodies (including the mobile method to evaluation the polygonal line of intersection, the evaluation of the polygonal line of two pyramids intersection). *Applied works (in-lab activity)*: practical applications regarding the point, straight line and plane representations, figures transformations, plane sections, deployment and line intersection to a polyhedral body, intersection of two polyhedrals).	5
					Chemistry The structure of the atom. Subatomic particles. The periodic system of the elements. Chemical bonds. Chemical reactions. Aggregation states of matter. Calculation elements in chemistry. Acids and bases. Ionic balances. The chemistry of chemical elements and compounds	4
					Physics	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Course content: CAP.1 ELEMENTS OF CLASSICAL MECHANICS, 1.1 Values characteristic of classical mechanics, 1.2 Fundamental principles of classical dynamics, 1.3 Theorems of variation in the dynamics of material point, **CAP.2 MECHANICAL OSCILLATIONS AND WAVES,** 2.1 Linear harmonic oscillator, 2.2 Damped oscillations, 2.3 Maintained oscillations , 2.4 Composition of oscillations, 2.5 Elastic waves, 2.6 Propagation of waves through different media, 2.7 Interference and diffraction of elastic waves, 2.8 Doppler effect, **CAP.3 IDEAL GAS,** 3.1 Characteristic Values, 3.2 Thermal state equation, 3.3 Ideal gas transformations, **CAP.4 FUNDAMENTAL NOTIONS OF THERMODYNAMICS**, 4.1 Thermodynamic systems and parameters, 4.2 Principle I of thermodynamics, 4.3 Principle II of thermodynamics, 4.4 Principle III of thermodynamics, **CAP.5 CALORIMETRY,** 5.1 Transfer heat, 5.2 Specific heat and molar heat, 5.3 Phase change, **CAP.6 ELEMENTS OF STATICS AND FLUID DYNAMICS,** 6.1 Pascal's Law, 6.2 Manometers, Barometers, 6.3 Archimedes' principle, 6.4 Surface tension, 6.5 Bernoulli's principle, **CAP. 7 ELECTROSTATICS,** 7.1 Main Values in electrostatics, 7.2 Mechanical work of the forces of an electric field, 7.3 Gauss's law, **CAP.8 ELECTROCINETICS,** 8.1 Main quantities in electrokinetics, 8.2 Law of continuity, 8.3 Electrical circuits, **CAP.9 MAGNETOSTATICS,** 9.1 Values major in magnetostatics, 9.2 Biot-Savart-Laplace's formula, 9.3 Laws of material **Laboratory content:** 1. Labor protection, Values and fundamental units of measurement in physics. General methods of measurement. Calculation of errors in the case of direct and indirect measurements, 2. Analysis of elastic waves, 3. Propagation of sounds in the air, 4. Experimental realization of electrical circuits; interchangeability of measuring devices, 5. Study of the Seebeck effect, 6. Determination of variation of electrical resistance with temperature, 7. Laboratory Colloquium	
					Materials science and engineering **Course content:** Introduction, brief history. Nature and structure of metals, real crystals. Phases and constituents in alloy systems. Balance diagrams. Solidification of metals and alloys. Methods of investigation of the metallic state, investigation of the structure. Testing of metals. Fe-C alloys used in	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					industry. Non-ferrous metals and alloys. Thermal processing of metals. News in the field. **Laboratory content:** Labor protection. Material recognition. Preparation of metallographic products. Methods of analyzing the structure of metallic materials. Structural constituents in metals and alloys. Analysis by electric arc emission spectroscopy. Shock bending tests. Determination of metal hardness. Microstructure of carbon steels. Font microstructure. Check.	
					Physical Education I Presenation of a minimal theoretical content aimed at the physical education activity. Consolidation of the main processes in fotbal-boys and voleyball-girls,known from previous cycles.	1
					English I Production. Specialized vocabulary and discourse situations. Grammar in focus: Present tenses (present simple, present continuous, present perfect) Research and Development. Specialized vocabulary and discourse situations. Grammar in focus: Past tenses (past simple, past continuous, past perfect) Information Technology. Specialized vocabulary and discourse situations. Grammar in focus: Future forms Logistics. Specialized vocabulary and discourse situations. Grammar in focus: Conditionals Quality. Specialized vocabulary and discourse situations. Grammar in focus: Verb phrases Health and Safety. Specialized vocabulary and discourse situations. Grammar in focus: Verb phrases	2
				2	**Linear algebra, analytic and differential geometry** Vector spaces. Subspaces. Operations with subspaces. Linearly independent and dependent vectors. System of generators of a vector space. Basis of a vector space. Change of a basis of a vectorial space. Substitution lemma. Gauss-Jordan method. Applications of Gauss-Jordan method. Euclidean vector spaces. Orthogonal and orthonormal bases. Gramm-Schmidt process. Linear applications. Linear forms. Bilinear forms. Quadratic forms. Jacobi and Gauss methods of reducing a quadratic form. Scalar, cross and mixed products of vectors. Plane in space. Line in space. Quadrics. Sphere. Surface of rotation, cylindrical and conical surfaces. Curves. Tangent line to a curve.	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Frenet trihedron. Curvature and torsion of a curve. Surfaces. Tangent plane and normal line to a surface. Orientation of a surface. Curve on a surface. First and second fundamental forms of a surface. Total and mean curvatures of a surface.	
					Applied informatics II Microsoft Excel (Opening a register; Formats in the workspace; Table calculation; Inserting objects into the workspace; Editing calculation formulas; Data operations; Create a chart using the Chart Wizard application; Page formatting; View; Printing of files); Microsoft Powerpoint (General presentation; Basic concepts; Creating a presentation; Slide viewing; Creating a new slide; Creating abstracts; Effects applied to slides; The transition between slides); Data compression. Archiving programs Usefulness of the Internet, WorldWideWeb; Microsoft outlook.	4
					Technical Drawing and Infographic I The representation in orthogonal projection of the pieces. Dimensioning of technical drawings. Representation, dimensioning and scoring of threads. Representation and dimension of the flanges. Axonometric representations. Notation of surface condition and dimensional accuracy. Representation of removable and non-removable assemblies. Making of the overall drawing.	5
					Numerical Methods *The main objective of the course*: Acquiring the knowledge necessary to use available numerical methods and, additionally, associated programming techniques, for computationally solve the mathematical expressions and/or processing the numerical datum, in order to evaluation and analysis the simulation and/or tested models. *The following topics are included*: Basics of numerical versus symbolical calculus, Datum interpolation, extrapolation and regression, Evaluation of the extreme values for numerical/analytical functions, Solving the algebraic equations and systems of algebraic equations, Numerical derivatives, Numerical integrations, Solving the Ordinary Differential Equations (ODE) and systems of ODEs, Solving the Partial Derivative Equations (PDE). *Applied works (in-lab activity)*: Numerical examples and computational applications related to each chapter presented on topics.	4
					Mechanics I	6

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Course content: Introduction to Newtonian mechanics. Introduction to static. Free material point statics. Static of the material point subject to connections. Links. Rigid statics. Notions. Reduction of any forces. Particular forces systems. Reduction of particular forces. Mass centers. Static moments. The balance of the rigid free and subject to ideal connections. The balance of the rigid subject to real connections. Static material systems. Points and rigid. Static articulated bar systems. Beams with lattices. Static filiform systems. Wire configuration. The applications of static in mechanical engineering. *The content of the seminar or practical works:* Introduction - vector operations. Applications; Moment of force relative to a point and an axis. Applications; Reduction of force systems, center axis, reduction cases. Applications; Mass Centers. Applications; Equilibrium of the rigid subject to ideal bonds. Applications; Statics of material systems. Applications; Friction systems. Applications.	
					Physical Education II Settling in atack and defense game sistems.Billateral games.Development of the elements of coordinative capacity: rhythm, precision, combination of movements, ambydextry, agility.Educate the general force on the upper, lower limbs, abdomen and trunk by the method of working in the circuit an by working on workshops.	1
					English II *Engineering*. Specialized vocabulary and discourse situations. Grammar in focus: Active vs. Passive. Relative clauses *Automotive*. Specialized vocabulary and discourse situations. Grammar in focus: Causation *Metallurgy*. Specialized vocabulary and discourse situations. Grammar in focus: Obligation and requirements *Welding*. Specialized vocabulary and discourse situations. Grammar in focus: Cause and effect *Construction*. Specialized vocabulary and discourse situations. Grammar in focus: Ability and inability	2
					General economy Structure of the national economy. National economic complex. Market Economy. The economic balance. Macroeconomics policies. The law of	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					demand. The law of supply. Capital market. The functioning of the capital market. Labor market. Unemployment (The classical analysis of the real sector-determination of employment, income and interest rate; Unemployment Defining and Measuring the Unemployment Rate – Counting of Unemployed – Employed, Unemployed, Labour Force, Discouraged Workers. Economic Costs of High Unemployment. Types of Unemployment – Frictional Unemployment and Job Search, Structural Unemployment and Cyclical Unemployment, Voluntary versus Involuntary Unemployment. Sources of Inflexibility in wages – minimum wages, unions and collective bargaining and efficiency wages). Companiy. The functions of the company.	
			2	**3**	**Technical Drawing and Infographic II** Getting started. Presentation of the window „New Fille". Overview of the working window. 2D working tools**.** Tools for modifying 2D entities**.** "Format" support tools. View tools in the "View" category. Dimension type annotation tools.	3
					Mechanics II *Course content:* Notions of point kinematics. Coordinate systems used in kinematics. Movement analysis by trajectory. Particular movements. Kinematics of the rigid in general motion. The study of speeds and accelerations (vectorial and analytical). Kinematics of the rigid in particular motion (vector and analytical). The relative movement of the material and rigid point. Kinematics of body systems. Introduction to dynamics. The dynamics of the material point. Theorems used in the dynamics of the material point. The dynamics of the free material point and subject to connections. Dynamics of the relative motion of the point. Dynamics of material point systems and rigid. General theorems in the dynamics of material point systems and the rigid. Dynamics of the relative motion of material point systems or rigid relative to the center of gravity. Koening's theorems. The applications of kinematics and dynamics. Dynamics of impulsive movements. Shocks and percussions. Fundamentals of analytical mechanics. D'Alembert's principle. The principle of virtual mechanical work. Lagrange's equations. Seminar content: applications at courses content.	6

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Strength of materials I *The main objective of the course:* Familiarization of the future mechanical engineer with the main calculation tools, necessary for dimensioning, verification and loading capacity calculation of the strength structural elements. *The following topics are included:* - Introduction to Strength of Materials. Problems in Strength of Materials. Displacements, deformations, internal forces, stresses. Assumptions in Strength of Materials. Sectional efforts in bars. Sections method. Calculation of sectional efforts. Sign rule. Differential relationships between sectional efforts and loads. Methods of drawing sectional effort diagrams. Mobile concentrated forces. Lines of influence. - Static tensile testing of materials. General notions regarding on mechanical testing of materials. Tensile test diagram. Factors influencing the mechanical properties of materials. Permissible stresses. Tension and compression. Calculation relations for stresses and deformations. Dimensioning, verification, loading capacity. Calculation of vertical bars, taking into account their own weight. Statically indeterminate problems in tension and compression. Stresses caused by not allowed expansion or thermal contraction. Calculation of elastic wires. - Conventional shearing calculation. Formulas for stresses and deformations. Dimensioning, verification, loading capacity. Introduction to the calculation of joints. - Moments of inertia of plane figures. Definitions. Parallel axis theorem (Steiner's theorem). Variation of moments of inertia when rotating the coordinate axes. Principal axes, principal moments of inertia. Radius of gyration. - Torsion. Duality law of the shear stresses. Torsion of bars with circular sections. Torsion of rectangular bars and open profiles with thin walls. Torsion of thin-walled tubular bars. Bredt's formulas. Statically indeterminate problems in torsion. - Bending straight bars. Bending stresses. Navier's formula. Rational sections of bent bars and beams. Shearing stresses in bending. Juravski's formula. Longitudinal sliding and preventing it. Stresses in oblique bending and	6

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					crooked bending. Stresses in bending of beams with non-homogeneous sections. Logitudinal sliding in beams with non-homogeneous sections and preventing it. *Practical works (Seminar):* - Axial forces, shear forces and bending moments diagrams in straight bars, curved bars, systems made up of straight bars and /or curves. - Problems, questions and comments related to bars which are loaded with axial forces (tension or compression). - Problems, questions and comments related to conventional shearing calculation. - Problems, questions and comments related to moments of inertia of plane figures. - Problems, questions and comments related to torsion (torsion of bars with circular sections, torsion of rectangular bars and open profiles with thin walls, torsion of thin-walled tubular bars, statically indeterminate problems in torsion). - Problems, questions and comments related to bending (Navier's formula, rational sections in bending, Juravsky's formula, longitudinal sliding and preventing it, oblique bending and crooked bending, bending of beams with non-homogeneous sections, longitudinal sliding in beams with non-homogeneous sections and preventing it.) *Practical works (Laboratory):* - Safety norms in mechanical testing laboratories. The international system of units of measurement. - Tensile test diagram for ductile steel. - Verification of the straight bars in bending. - Verification of deformations in oblique bending. - Verification of the reciprocity theorem of displacements. - Steel resilience test. - Laboratory colloquium.	
					Thermotechnics Introduction into Thermodynamics; First Law of Thermodynamics; Ideal gases; Second Law of Thermodynamics; Methods of Thermodynamics; Third Law od Thermodinamics; Real Gases; Vapours; Humid Air;	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Refrigeration plants; Heat pumps; Heat transfer; Steam power plants; Steam boilers; Steam turbine; Power generation.	
					Mechanisms I *Course content:* Structure and classification of mechanisms. Elements. Kinematic element. Kinematic chain. Kinematic couple. Mechanism. Determination of planar mechanism configurations. Structural groups. Family of mechanisms. Mechanism. Features. Kinematic analysis of plane mechanisms with joints. The bar method. General relations. Application of the principle. Calculation example. Kinematic analysis of plane mechanisms with sliders. The bar method. General relations. Application of the principle. Calculation example. Kinematic analysis of mechanisms. The polygonal contour method. The principle of calculation. Application of the principle. Calculation example. Kinematics of spatial mechanisms. Calculation principles. Examples of solving spatial mechanisms. Cardan joint. Synthesis of plane mechanisms with bars. General principles. Structural synthesis. Kinematic synthesis. Examples of mechanisms synthesis starting from different functional conditions. Determination of reactions in kinematic pairs. The connection between the class and the couple's time and the specific reactions introduced. Locking of mechanisms. Calculation example. Cam mechanisms. General. Analysis of cam mechanisms. Synthesis of cam mechanisms. Motion laws imposed. *The content of practical works:* Kinematic couples. Determining the positions of a complex mechanism by graphical methods. Synthesis of a quadrilateral mechanism based on three imposed positions. Synthesis of a cam with a cosinusoidal profile. Generation of gear wheels. Determining the parameters of a cylindrical gear with straight teeth. Gearboxes. Differential.	4
					Physical Education and sport III Presentation of a minimal theoretical content aimed at the physical education activity. Consolidation of the main processes in fotbal-boys and voleyball-girls, known from previous cycles.	1
					Machine tools and machining by cutting Theoretical generation of surfaces. Generation of real surfaces on machine tools; Cinematic chains; Specific mechanisms widely used in the kinematic chains of machine tools; Mechanisms for adjusting the main kinematic	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					chains; Mechanisms for adjusting the kinematic feed chains; Elements of the cutting tool; Lathe; Universal milling machine; Drilling, grinding, broaching machines.	
					Ethics and Academic Integrity 1.Scientific research: Concept definition ; Teaching and research functions; Legislation of scientific research; The Ministry of research and innovation, the specialized body of the central public administration. 2. Standardization: Specific standards regarding the external evaluation of the study programs; Choosing the subject for the bachelor / dissertation work; Standards for drawing up character works scientific; Rules regarding the completion of studies; The structure of a scientific work; Citation and bibliography; Presentation of the paper; Multiple meanings of the licensing work and the one master's degree. 3. Ethics and ethics standards: The concept of ethics; Standards of ethics (morality); Ways to regulate ethics; Ethics in the University Charter and in the Ethics Codes of national universities; The University Ethics Committee. 4. Code of ethics and academic deontology- Values of university ethical conduct: Academic freedom; Personal autonomy; Justice and fairness; Talent; Academic honesty and fairness intellectual; Transparency; Personal and professional responsibility; Respect and tolerance; Collegiality; Confidentiality. 5. Good practice in scientific research: Deviations provided in the University Codes of Ethics; Sanctions applied to violations of university ethics and good conduct in research. 6. Academic integrity: Concept; Clarification of the concept of academic; integrity as a result of the modification of the National Education Law no.1 / 2011; Academic integrity reflected in the Codes of ethics and integrity of universities; Integrity in the Code of ethics and the rules of professional conduct of ARACIS.	2
				4	**Technical Drawing and Infographic III** Introduction to 3D infographic. Specific drawing commands at sketch level. Specific editing commands at sketch level. Tools for creating 3D features. Controls for generating working features. Freeform surface generation and modeling commands. Freeform surface generation and modeling commands.	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Commands for obtaining execution drawings. Fine tricks commands. Commands used to obtain 3D assemblies. Design method "bottom-up"/"top-down". Recapitulative applications.	
					Strength of materials II *The main objective of the course:* Familiarization of the future mechanical engineer with the main calculation tools, necessary for dimensioning, verification and loading capacity calculation of the strength structural elements. *The following topics are included:* - Deformations in beams and straight bars subjected to bending. The approximate differential equation of the deflection curve. Analytical integration of the approximate differential equation of the deflection curve. The method of reciprocal beams. The equation of the two anglles of rotations and the equation of the two bending-deflections. The equation of the three bending moments (Clapeyron's equation). Deformation of beams subjected to oblique or crooked bending. Statically indeterminate problems in bending of beams and straight bars. - General state of stress and deformation. The state of plane stress. The spatial stress state. Relationships between displacements and deformations. The state of plane deformations. The spatial deformation state. The generalized Hooke's law. Deformation energy. The relation between Young modulus, modulus elasticity in shear and Poisson's ratio for isotropic and omogenous materials. - Failure theories. Classical failure theories. The application of failure theories to state of plane stress. - Combined loadings. Bending with traction or compression. Loadings that lead to shear stresses. Loadings that lead to normal and shear stresses. - Energy methods for calculating linear-elastic displacements. Potential energy of deformation. Clapeyron's theorem. Castigliano's theorems. The Mohr-Maxwell formula. The Vereshceaghin method. Theorems of reciprocity of deformation energy and displacements (Betti's theorem and Maxwrll's theorem). The canonical equations of the efforts method. - Curved bars. Curved bars in plane loaded in their plane. Helical springs with tight coils.	6

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					- Elastic stability of slim straight bars. The critical loading of the straight bar subjected to axial compression. Euler's formula. The domain of validity of Euler's formula. Tetmajer-Iashinsky's formula for buckling in the elasto-plastic domain. Methods for solving buckling problems. - Dynamic loadings. Loadings due to forces of inertia. Shock loadings. The method of the impact multiplier ratio. - Notions for calculating flat plates. Bending of circular plates loaded symmetrically. Bending of rectangular plates which are supported on entire their contour and loaded uniformly distributed forces. Flat plates subjected to shock loading. - Revolution vessels with thin walls. Laplace's equation. Calculation of strength of thin-walled revolution vessels. - Tubes, spherical vessels with thick walls and rotating disks. Tube with internal and external pressure. Particular cases. Stresses produced by shrink fits. Spherical vessels with thick walls. Disk with constant thickness in rotational motion. - Notions about fatigue strength calculation. Classification of variable loadings. Fatigue strength. Diagrams of fatigue strength. Factors influencing for fatigue failure. Safety coefficient. *Practical works (Seminar):* - Problems, questions and comments related to deformations of the beams and straight bars subjected to bending. - Problems, questions and comments related to stresses and deformations in the general state of tension and deformation. - Problems, questions and comments related to bars subject to combined loadings. - Problems, questions and comments related to energetic methods of the deformations of the beams and straight bars subjected to bending. - Problems, questions and comments related to statically indeterminate systems made up of straight bars. - Problems, questions and comments related to curved bars. - Problems, questions and comments related to buckling of the slim straight bars in compression. - Problems, questions and comments related to strength structures subjected	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					to dynamic loadings. - Problems, questions and comments related to flat plates. - Problems, questions and comments related to thin-walled revolution vessels. - Problems, questions and comments related to tubes, spheres with thick walls and rotating disks. - Problems, questions and comments related to fatigue.	
					Fluid mechanics I Introduction in fluid mechanics. Fluids physical properties. Fluid mechanics fundamental equations. General theory of static. The compressible fluids statics fundamental equation. Hydrostatic force over the flat area. General theory of kinematics. Kinetic notions and physical quantities. General equations of ideal fluid dynamics. Bernoulli's equation - Interpretation and applications.	3
					Finite element method *The main objective of the course:* Familiarization of the future mechanical engineer with the principles of applying the finite element method to the analysis of strength structures, while also seeking the creation of basic working skills, needed in the use of finite element analysis software environments. *The following topics are included:* - Introduction. Numerical methods dedicated to strength structures calculating, in the current context. Advantages and disadvantages of numerical methods dedicated to strength structures calculating. - Functionality of the finite element analysis software environments. Introduction. The internal architecture of the finite element analysis software environments. The main functionalities of the preprocessing module. The main functionalities of the post-processing module. Analysis reports. - The calculation model in mechanics of the strength structures. Introduction. The physical model of the strength structures. The mathematical model in mechanics of the strength structures. - The basis of the finite element method. Introduction. The stages of applying the finite element method. Classes of finite elements. Reference systems. Displacements and forces vectors. Interpolation functions. Natural	3

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					coordinates. Local and global stiffness matrix. - Optimal modeling of the strength structures. Establishing the relevant results and the level of their accuracy. Adopting the appropriate material model. Simplifying the real geometry. - Analysis of the finite element analysis software adopted for practical works. Analysis of the opportunity to use a finite element analysis environment. Choosing the software solution and establishing the necessary hardware resources. Cost estimation (hardware costs, licensing costs, operating costs, etc.). *Practical works (Laboratory):* - Presentation of the finite element analysis platform and main operating tools and capabilities. - Analysis of the strength structures made of hinged bars in 2D (planar truss structures). - Analysis of the strength structures made of hinged bars in 3D (spatial truss structures). - Analysis ot the strength structures made of rigidly connected bars. - Analysis of the strength structures assimilable to plates. - Analysis of massive strength structures. - Geometry import. - Simplification of the geometry of the strength structural elements. - Analysis of assemblies with parts in contact. - Post-processing the results and generating the analysis reports. - Notions regarding the analysis of the effects of the stresses concentrators. - Laboratory colloquium.	
					Mechanisms II *Course Content:* Balancing rotors. General balancing conditions. Rotor balancing theorem. Balancing shorts rotors. Dynamic balancing. Rotors balancing machines and devices. Balancing the cars. General principles. Examples of balancing mechanisms. Gear mechanisms. General. Principles of scoring. Kinematics of mechanisms with fixed and mobile axes. The fundamental theorem of gear. Curves. Evolution and its qualities. Gear kinematics. Reference rack. Continuity of gear. The degree of coverage. Moving profiles. Cylindrical gears with inclined teeth. Conical gear. Screw	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					gear. Forces in gear. Energy balance of the mechanisms. Phases of machines movement. Study of the movement of machines and mechanisms. Reduction theorems. Integration of differential equations of mechanism movement. The uniformty of the movement of machines. Degree of non-uniformity. *The content of practical works:* Project theme presentation. Synthesis of the complex mechanism. Determining the main dimensions of the mechanism. Choosing standardized elements. Establishing kinematic calculation relationships. Realization of the numerical calculation algorithm. Realization of the numerical calculation program. Project presentation.	
					Mechanical Vibration *The main objective of the course:* to acquire the necessary knowledge and skills for the calculation, design, execution and operation, as well as the analysis and diagnosis of the vibration operated or disturbed elastic mechanical systems. *Course contents:* 1.Introductory elements in mechanical vibration; 2.Harmonic vibration kinematics; 3.Elements of dynamics of mechanical systems vibration; 4.Vibrations of 1DOF linear mechanical systems; 5.Vibrations of 2DOF linear mechanical systems; 6.Vibrations of the viscous-elastic rigid body modeled as 2DOF linear system; 7.Vibrations of nDOF linear mechanical systems; 8.Elements of vibration effects analysis and vibration protection. *Practical works (Seminar):* 1.Compound harmonic vibrations; 2.Calculus of equivalent elasticity coefficients of series and parallel springs. Calculus of the elastic coefficients of the tension-compression springs and torsion springs; 3.Calculus of the elasticity coefficients of the bending springs. Stability study of elastic mechanical systems 1DOF, 2DOF; 4.Free vibrations of 1DOF elastic systems: calculus of inertia and stiffness coefficients, calculus of eigenfrequncy, determination of the law of motion; 5.Forced vibrations of 1DOF elastic systems: laws of motion in case of harmonic and inertial type disturbance. Forced vibrations of the non-harmonic and polyharmonic perturbed 1DOF systems; 6.Structural characteristics of 2DOF elastic mechanical systems (inertia matrixx, stiffness matrix, eigenfrequencies, eigenvectors); 7.Forced vibrations of the 2DOF elastic	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					mechanical systems: modal coordinates, orthogonality conditions, the amplitudes of the forced vibrations.	
					Physical Education and sport IV Settling in atack and defense game sistems. Billateral games. Development of the elements of coordinative capacity: rhythm, precision, combination of movements, ambydextry, agility. Educate the general force on the upper, lower limbs, abdomen and trunk by the method of working in the circuit an by working on workshops.	1
					Field practice Labor protection training, knowledge of the sectors of the company S.C.Promex S.A. and the organizational chart of the company. Obtaining the castings, forged, laminated, welded construction semi-finished products. Heat treatments for improvement, hardening, cement, nitriding, induction, relief, annealing. Knowledge of mechanical processing sections and component workshops. Innovation, progress factor to obtain an optimum quality / price ratio. Closing the activity and granting the qualification.	4
					Quality engineering Quality - objective of managerial activity; Defining quality. Basic concepts; Commitment to quality; Quality objectives; Quality implementation; The total quality system; Quality audit; The evolution of quality control; Statistical control; Total quality control; Competitive engineering. Flexible manufacturing; "Just in Time" technique. "Zero defects" technique; Quality control through three-dimensional control.	3
				5	**Machine parts I** The first part presents the machine parts design basics, design methodology and the machine parts materials.In the following chapters there are presented the basics for fixed assemblies, removable assemblies, welded assemblies, rivet assemblies. There are also presented the basics for bearing.The all the above machine parts mentioned there are presented the function principle, efforts and all kind of resistance moments and the calculus methodology. The theoretical notions are demonstrated with practical works and a didactic project.	5
					Fluid mechanics II	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
			3		Dimensional analysis methods. The method of similarity Flow regimes. Bernoulli's equation. Study of laminar and permanent flow. Study of the turbulent flow regime. Study of the hydraulic load loss coefficient. Permanent flow through cylindrical ducts under pressure. Effluent flows through orifices and nozzles and over spills.	
					Electrotechnics and Electrical Machines and Drives I Fundamental of Electrotechnics; Laws of Electrotechincs; Electric field; DC&AC electrical circuits; Laws of electromagnetic field; Electrical transformer : equations, equivalent schemes, phasorial diagrames, operating mode**.**	3
					Hydraulic and pneumatic actuation I Principles of hydrostatic actuation systems. Specific circuits. Fluid types used in actuation. Construction and operating principles of hydraulic and pneumatic drive components (pumps, motors, distributors, circuit protections, filters, connectors, oil housings, control and adjustment systems). Coupling of hydraulic drive components (coupling of pumps, motors, distributors, circuit protections, accumulators, filters).	5
					Agricultural machinery and installations I *Course content:* Destination; The working process; Agro-technical requirements; Construction of work organs and construction of machinery; Machine settings. Qualitative indices of work; Execution of the work. Maintenance work, at Chapter 1. Plows. Harrows. Cultivators. Machines for deep soil remediation. Rollers. Soil molding machines. Agricultural milling cutters. Digging machines. Chapter 2. Sowing machines. Planting machines. Chapter 3. Machines for mineral fertilizer administration. Machines for spreading organic fertilizers. Machines and machines for fighting diseases and pests in agricultural crops. *Content of the seminar or practical work:* Identification of the component parts of the machine; practical study of the way of making the adjustments and specifying the rules for executing the works with the studied machine, within: L1- Plows. L2- Grape. L3- Cultivators. L4- Machines for deep soil remediation. L5- Rollers. L6- Soil molding machines. L7- Agricultural milling cutters. L8- Digging machines.	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					L9- Drilling machines. L10- Planting machines.	
					Transportation systems *The following topics are included:* 1. Specific mechanisms for transportation systems 1.1. Flexible organs for transporting machines (cables, belts, chains). 1.2. Winding and driving bodies (rollers, drums, wheels). 1.3. Braking and speed adjustment mechanisms for transporting systems. 1.4. Characteristics of bulk transported materials : granulation, slope angle, crumbling angle. 1.5. Mechanisms for grasping packaged materials (clamps, pliers). 2. Transport systems 2.1. Belt conveyors: construction, operation, technological and constructive dimensioning. 2.2. Bucket elevators: construction, operation, technological and constructive dimensioning 2.3. Helical conveyors: construction, operation, technological and constructive dimensioning. 2.4. Pneumatic conveyors: construction, operation, technological and constructive dimensioning. 2.7. Bunkers and silos. *Laboratory:* Flexible parts for lifting and transporting machines; Experimental determination of the the roller-cable assembly stiffness coefficient; Brakes; Conveyor belts; Bucket conveyors; Pneumatic conveyor. *Project:* 1. Design theme introduction: Designing a carrier having the following as initial data: transported material; Transport capacity; Distance; Level difference; Route shape. 2. Student orientation on the overall constructive form. 3. Analysis of similar constructive solutions. 4. Evaluation of the overall shape and dimensions to achieve the design theme: width and shape of the band, the distance between the rollers on the different segments, how to upload and download. 5. Sizing the band and rollers and the calculation of the driving forces.	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					6. Drive calculation, transmission dimensioning, gearbox choice, brake, electric motor. 7. Sizing of loading and unloading. Graphics: Whole drawing and two execution drawings.	
					Dynamics and stability of technological equipment *The main objective of the course:* to acquire the necessary knowledge and skills for the calculus, design, execution and operation, as well as the analysis and diagnosis of machines and installations for agriculture and food industry in dynamic regime (stationary or transient). *Course contents:* 1.Introductory elements in mechanical system dynamics; 2.Dynamic modeling of mechanical systems; 3.Analysis of the dynamic loads of the mechanical systems in stabilized regime; 4.Dynamics of machines and installations for agriculture and food industry in transient regimes; 5.Dynamics of machines and installations for agriculture and food industry modeled as nDOF systems; 6.Dynamics of machines and installations for agriculture and food industry. Physical and mathematical modeling. Dynamic and functional parametric correlations; 7.Vibration isolation of the machines and installations for agriculture and food industry. *Practical works (Seminar):* 1.Calculus of equivalent characteristics (inertia, elastic and viscous damping coefficients, generalized dynamic forces) for a mechanical system. Physical and mathematical models (2/3/4/5 / 6DOF); 2.Calculus of dynamic characteristics (eigenfrequencies, eigenvectors) and the amplitude and frequency response of mechanical systems 2/3/4/5/6DOF subjected to dynamic and kinematic loads; 3.Calculus of the dynamic loads transmitted by the mechanical systems to the foundation structure; calculus of the isolation ratio. *Practical works (Project):* project theme and individual parameters; functional variants according to the imposed requirements; constructive-functional variant of the machine (technological equipment); dynamic model of the machine (technological equipment); analysis of model parameters (structural, functional, technological, economic); analysis of the dynamic parameters of the model in various operating regimes (start, stop, stabilized regime, overload).	5
				6	**Machine parts II**	6

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					The second part presents the basic elements for friction, its characteristics and kinds. In the following chapters there are presented the fworking principle, efforts and all kind of resistance moments and the calculus methodology for gears, shafts, belt drives, chain drives, spee variators, couplings, springs, sealings. At the end it is presented a sistemic design for a complex gearbox. The theoretical notions are demonstrated with practical works and a didactic project.	
					Electrotechnics and Electrical Machines and Drives II Asynchronous machine: equations, equivalent schemes, phasorial diagrames, operating mode; DC electrical machines: equations, equivalent schemes, phasorial diagrames, operating mode; Drives: power converters, adjusment systems; mechanical load.	4
					Hydraulic and pneumatic actuation II Hydraulic power and control systems used in the operation of technological equipment. Calculation of the hydraulic and pneumatic systems main operating parameters. Power steering systems. Hydrostatic and pneumatic transmissions. Hydraulic systems for operating the agricultural equipments and food industry machinery. Pneumatic systems for driving food industry machinery and installations. Hydraulic systems for automatic adjustment of agricultural machinery. Hydraulic systems for driving the tractors suspension mechanisms.	5
					Agricultural machinery and installations II *Course content:* Destination; The working process of the machine; Agro-technical requirements; Construction of working bodies; Construction of harvesting machines; Harvesting machine settings; Qualitative indices of work at harvesting work; Execution of the harvesting work; Maintenance work for combine harvesters, at harvesters studied at: Chapter 1. Machines for harvesting stale cereals. Grain maize harvesting machines. Sunflower harvesting machines. Chapter 2. Machines for harvesting fodder plants. Chapter 3. Potato harvesting machines. Beet harvesting machines. Chapter 4. Textile plant harvesting machines. Chapter 5. Machines for harvesting horticultural crops. Chapter 6. Machines for transporting, loading and unloading agricultural products.	5

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Content of the seminar or practical work: Construction and operation; Adjustments and formation of aggregates; Determining the qualitative indices of work; Technical maintenance; The labor protection rule and p.s.i. in the : L1- Study of machines for harvesting stale cereals. L2- Study of the maize harvesting machines for grains. L3- Study of the machines for harvesting the sun flower. L4- Study of machines for harvesting fodder plants. L5- Study of potato harvesting machines. L6- Study of beet harvesting machines. L7- Study of machines for harvesting textile plants. L8- Study of machines for harvesting horticultural crops. L9- Study of machines for the transport, loading and unloading of agricultural products.	
					Practice The main objective of the practice is to familiarize and acquire by students the operations and working processes from units with specific in the field of machinery and installations for agriculture and food industry. This fall and increasing knowledge about construction, operation, repair and operation of machinery and equipment for agriculture and food industry.	4
					Green mechanization technologies 1. Introduction. 2. Ecological mechanical technologies to improve soil fertility using natural green manure. 3. Ecological mechanization technologies for plant cultivation:cereals- bean-oily plants-textile plants, tuberculiferous and root plants-fodder plants. 4. Ecological mechanical technologies for setting up winter cover crops and soil protection. 5. Ecological mechanical technologies for feed conservation. 6. Ecological mechanization technologies for landscaping rehabilitation. 7. Ecological mechanization technologies for animal breeding: cattle breeding technologies-pig breeding technologies; sheep breeding technologies. 8. Ecological mechanization technologies regarding the processing of animal products. 9. Ecological mechanization technologies for the conservation of agricultural products: storage of cereals -preservation of vegetables and fruits; food preservation.10. Ecological technologies regarding the transport of agricultural products respecting the standard conditions.	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Milling Bakery Machinery *Course content:* 1. Introduction: cereal raw materials, elements for assessing the quality of cereals, specific technological flows for cereals for human consumption. 2. Technological systems for storage, discharge, special treatments and dust control: technological systems for storage, discharge, technological systems for the circulation of cereals within the silo, technological systems for special treatments applied to cereals, aeration installations, technological systems for dust control: fans, cyclone, separators 3. Machinery and installations for the conditioning of the raw material of the dinner: equipment for the separation of impurities, machines for peeling cereals, machines for brushing cereals, machines for washing cereals, specific systems for the conditioning of wheat for grist. 4. Technological systems for grinding cereals: the theoretical basis of the process of grinding cereals, processes and machines for rolling mills, grinding stones, grinding with displacement 5. Machines for sorting the control and homogenization of milled products: machines for sorting by sifting, technological systems for the control and homogenization of the finished products, technological systems for the control of flour, technological systems for homogenizing the flour 6. Elements of the theory and calculation of productive mill structures: criteria for establishing the mill diagram 7. The baking process. Preparation of raw materials for manufacturing: introduction into the bakery, the technological process of making bread, flour conditioning equipment, yeast, brine, brine, brine, essential components of the dough. 8. Kneading the dough. Kneading machines: kneading methods and procedures, variation of the moment at kneading, kneading with discontinuous flow: constructive solutions, calculation elements, kneading	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					with continuous flow: constructive solutions, working process, kneading elements 9. Dividing the dough into pieces: analysis of the operation of dividing the dough, machines for dividing the dough: classification, constructive characteristics, operating principles, elements of calculation when dividing the dough 10. Modeling the dough pieces: Analysis of the modeling operation, premodeling and round modeling of the dough: principles of round modeling, long-format modeling of the dough pieces: the classical system and the system with winding, calculation elements when modeling the dough pieces: lamination; rolling 11. Baking process of bakery products and bread ovens: mechanism of baking process, material balance and energy balance of baking, bread ovens: direct gas ovens, recirculated gas ovens, baking chambers and heat exchange calculation in the baking room, dampening installations of the baking chambers *Laboratory contain:* 1. Conventional symbols and signs in the milling industry. Schematic representation and interpretation of a technological milling diagram. 2. Determining the constructive, functional and energetic parameters of the husking, peeling, degermining and brushing of cereal seeds for further processing. 3. Determining the constructive and functional parameters of specific machines for screening and sorting intermediate machine products 4. Studying the kneading of the dough with a spiral knob with planetary motion 5. Determination of the parameters of the baking process for a kneading, baking and baking appliance with reduced capacity (characteristic temperatures, specific energy consumption, etc.)	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units

Study domain	Level (BA/MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Mechanical Engineering	**BA**	**Technological equipment for constructions**	**1**	**1**	**Mathematical analysis** Series of real numbers. Sequences and series of real functions. Power series. Taylor series. Functions of several real variables. Limits. Continuity. Partial derivatives of I and II order. Differentials of I and II order. Extreme values of functions of several real variables. Constrained extrema and Lagrange multipliers. Improper integrals. Euler integrals. Scalar and vector line integrals. Applications of line integrals in mechanics. Double integrals. Applications of double integrals in mechanics. Triple integrals. Applications of triple integrals in mechanics. First order differential equations.	5
					Applied informatics I Components and operation of the computer; Operating systems; Classification of operating systems; MS DOS (Disk Operating System) operating system; Comparison of Windows operating system versions; The Windows operating system; Processors of texts: Microsoft Word; Notions of editing; Word screen elements; Basic commands and operations; Formatting the text; Working with tables; Menus; Working with long documents (creating the table of contents, creating an index); The equation editor; Efficient use of Word; Fragmentation the text into sections.	4
					Descriptive Geometry *The main objective of the course*: Acquiring the knowledge necessary to reasoning the spatial relations with the view of transposing them into the bi-dimensional projection system, and to use the bi-dimensional representation tools for basic geometrical elements like point, straight line, plane, surface, and body. *The following topics are included*: The representation of the point and the straight line into the triple orthogonal projection (available notations and conventions, the point into a triple orthogonal projection, the straight line in space and draught representation, the line traces, the particular positions of a line related to the projection planes, the relative positions of two lines on space); The representation of the plane through the elements that define it (including methods and techniques of plane defining, the plane traces, the line and point including by a plane, the relative positions of a line related to a	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					plane, the relative position of a two plane, the intersection of a line with a plane); The view methods in descriptive geometry (including the basics of visibility, the plane changing method, the rotation method, the folding method); The representation of the bodies limited by polyhedral surfaces (including the representation of the prism and the pyramid, the plane sections into prisms and pyramids, the straight line intersection with a prism and a pyramid, the deployment of the prism and pyramid); Intersections of polyhedral bodies (including the mobile method to evaluation the polygonal line of intersection, the evaluation of the polygonal line of two pyramids intersection). *Applied works (in-lab activity)*: practical applications regarding the point, straight line and plane representations, figures transformations, plane sections, deployment and line intersection to a polyhedral body, intersection of two polyhedrals).	
					Chemistry The structure of the atom. Subatomic particles. The periodic system of the elements. Chemical bonds. Chemical reactions. Aggregation states of matter. Calculation elements in chemistry. Acids and bases. Ionic balances. The chemistry of chemical elements and compounds	4
					Physics **Course content: CAP.1 ELEMENTS OF CLASSICAL MECHANICS,** 1.1 Values characteristic of classical mechanics, 1.2 Fundamental principles of classical dynamics, 1.3 Theorems of variation in the dynamics of material point, **CAP.2 MECHANICAL OSCILLATIONS AND WAVES,** 2.1 Linear harmonic oscillator, 2.2 Damped oscillations, 2.3 Maintained oscillations , 2.4 Composition of oscillations, 2.5 Elastic waves, 2.6 Propagation of waves through different media, 2.7 Interference and diffraction of elastic waves, 2.8 Doppler effect, **CAP.3 IDEAL GAS,** 3.1 Characteristic Values, 3.2 Thermal state equation, 3.3 Ideal gas transformations, **CAP.4 FUNDAMENTAL NOTIONS OF THERMODYNAMICS**, 4.1 Thermodynamic systems and parameters, 4.2 Principle I of thermodynamics, 4.3 Principle II of thermodynamics, 4.4 Principle III of thermodynamics, **CAP.5 CALORIMETRY,** 5.1 Transfer heat, 5.2 Specific heat and molar heat, 5.3 Phase change, **CAP.6 ELEMENTS OF STATICS AND FLUID DYNAMICS,** 6.1 Pascal's Law,	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					6.2 Manometers, Barometers, 6.3 Archimedes' principle, 6.4 Surface tension, 6.5 Bernoulli's principle, **CAP. 7 ELECTROSTATICS,** 7.1 Main Values in electrostatics, 7.2 Mechanical work of the forces of an electric field, 7.3 Gauss's law, **CAP.8 ELECTROCINETICS,** 8.1 Main quantities in electrokinetics, 8.2 Law of continuity, 8.3 Electrical circuits, **CAP.9 MAGNETOSTATICS,** 9.1 Values major in magnetostatics, 9.2 Biot-Savart-Laplace's formula, 9.3 Laws of material **Laboratory content:** 1. Labor protection, Values and fundamental units of measurement in physics. General methods of measurement. Calculation of errors in the case of direct and indirect measurements, 2. Analysis of elastic waves, 3. Propagation of sounds in the air, 4. Experimental realization of electrical circuits; interchangeability of measuring devices, 5. Study of the Seebeck effect, 6. Determination of variation of electrical resistance with temperature, 7. Laboratory Colloquium	
					Materials science and engineering *Course content:* Introduction, brief history. Nature and structure of metals, real crystals. Phases and constituents in alloy systems. Balance diagrams. Solidification of metals and alloys. Methods of investigation of the metallic state, investigation of the structure. Testing of metals. Fe-C alloys used in industry. Non-ferrous metals and alloys. Thermal processing of metals. News in the field. *Laboratory content:* Labor protection. Material recognition. Preparation of metallographic products. Methods of analyzing the structure of metallic materials. Structural constituents in metals and alloys. Analysis by electric arc emission spectroscopy. Shock bending tests. Determination of metal hardness. Microstructure of carbon steels. Font microstructure. Check.	5
					Physical Education I Presenation of a minimal theoretical content aimed at the physical education activity. Consolidation of the main processes in fotbal-boys and voleyball-girls,known from previous cycles.	1
					English I Production. Specialized vocabulary and discourse situations. Grammar in focus: Present tenses (present simple, present continuous, present perfect) Research and Development. Specialized vocabulary and discourse situations.	2

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Grammar in focus: Past tenses (past simple, past continuous, past perfect) Information Technology. Specialized vocabulary and discourse situations. Grammar in focus: Future forms Logistics. Specialized vocabulary and discourse situations. Grammar in focus: Conditionals Quality. Specialized vocabulary and discourse situations. Grammar in focus: Verb phrases Health and Safety. Specialized vocabulary and discourse situations. Grammar in focus: Verb phrases	
				2	**Linear algebra, analytic and differential geometry** Vector spaces. Subspaces. Operations with subspaces. Linearly independent and dependent vectors. System of generators of a vector space. Basis of a vector space. Change of a basis of a vectorial space. Substitution lemma. Gauss-Jordan method. Applications of Gauss-Jordan method. Euclidean vector spaces. Orthogonal and orthonormal bases. Gramm-Schmidt process. Linear applications. Linear forms. Bilinear forms. Quadratic forms. Jacobi and Gauss methods of reducing a quadratic form. Scalar, cross and mixed products of vectors. Plane in space. Line in space. Quadrics. Sphere. Surface of rotation, cylindrical and conical surfaces. Curves. Tangent line to a curve. Frenet trihedron. Curvature and torsion of a curve. Surfaces. Tangent plane and normal line to a surface. Orientation of a surface. Curve on a surface. First and second fundamental forms of a surface. Total and mean curvatures of a surface.	4
					Applied informatics II Microsoft Excel (Opening a register; Formats in the workspace; Table calculation; Inserting objects into the workspace; Editing calculation formulas; Data operations; Create a chart using the Chart Wizard application; Page formatting; View; Printing of files); Microsoft Powerpoint (General presentation; Basic concepts; Creating a presentation; Slide viewing; Creating a new slide; Creating abstracts; Effects applied to slides; The transition between slides); Data compression. Archiving programs Usefulness of the Internet, WorldWideWeb; Microsoft outlook.	4
					Technical Drawing and Infographic I The representation in orthogonal projection of the pieces. Dimensioning of	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					technical drawings. Representation, dimensioning and scoring of threads. Representation and dimension of the flanges. Axonometric representations. Notation of surface condition and dimensional accuracy. Representation of removable and non-removable assemblies. Making of the overall drawing.	
					Numerical Methods *The main objective of the course*: Acquiring the knowledge necessary to use available numerical methods and, additionally, associated programming techniques, for computationally solve the mathematical expressions and/or processing the numerical datum, in order to evaluation and analysis the simulation and/or tested models. *The following topics are included*: Basics of numerical versus symbolical calculus, Datum interpolation, extrapolation and regression, Evaluation of the extreme values for numerical/analytical functions, Solving the algebraic equations and systems of algebraic equations, Numerical derivatives, Numerical integrations, Solving the Ordinary Differential Equations (ODE) and systems of ODEs, Solving the Partial Derivative Equations (PDE). *Applied works (in-lab activity)*: Numerical examples and computational applications related to each chapter presented on topics.	4
					Mechanics I *Course content:* Introduction to Newtonian mechanics. Introduction to static. Free material point statics. Static of the material point subject to connections. Links. Rigid statics. Notions. Reduction of any forces. Particular forces systems. Reduction of particular forces. Mass centers. Static moments. The balance of the rigid free and subject to ideal connections. The balance of the rigid subject to real connections. Static material systems. Points and rigid. Static articulated bar systems. Beams with lattices. Static filiform systems. Wire configuration. The applications of static in mechanical engineering. *The content of the seminar or practical works:* Introduction - vector operations. Applications; Moment of force relative to a point and an axis. Applications; Reduction of force systems, center axis, reduction cases. Applications; Mass Centers. Applications; Equilibrium of the rigid subject to ideal bonds. Applications; Statics of material systems. Applications; Friction systems. Applications.	6
					Physical Education II	1

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Settling in atack and defense game sistems.Billateral games.Development of the elements of coordinative capacity: rhythm, precision, combination of movements, ambydextry, agility.Educate the general force on the upper, lower limbs, abdomen and trunk by the method of working in the circuit an by working on workshops.	
					English II *Engineering*. Specialized vocabulary and discourse situations. Grammar in focus: Active vs. Passive. Relative clauses *Automotive*. Specialized vocabulary and discourse situations. Grammar in focus: Causation *Metallurgy*. Specialized vocabulary and discourse situations. Grammar in focus: Obligation and requirements *Welding*. Specialized vocabulary and discourse situations. Grammar in focus: Cause and effect *Construction*. Specialized vocabulary and discourse situations. Grammar in focus: Ability and inability	2
					General economy Structure of the national economy. National economic complex. Market Economy. The economic balance. Macroeconomics policies. The law of demand. The law of supply. Capital market. The functioning of the capital market. Labor market. Unemployment (The classical analysis of the real sector-determination of employment, income and interest rate; Unemployment Defining and Measuring the Unemployment Rate – Counting of Unemployed – Employed, Unemployed, Labour Force, Discouraged Workers. Economic Costs of High Unemployment. Types of Unemployment – Frictional Unemployment and Job Search, Structural Unemployment and Cyclical Unemployment, Voluntary versus Involuntary Unemployment. Sources of Inflexibility in wages – minimum wages, unions and collective bargaining and efficiency wages). Companiy. The functions of the company.	4
			2	**3**	**Technical Drawing and Infographic II** Getting started. Presentation of the window „New Fille”. Overview of the working window. 2D working tools**.** Tools for modifying 2D entities**.** "Format" support tools. View tools in the "View" category. Dimension type	3

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					annotation tools.	
					Mechanics II *Course contents:* Notions of point kinematics. Coordinate systems used in kinematics. Movement analysis by trajectory. Particular movements. Kinematics of the rigid in general motion. The study of speeds and accelerations (vectorial and analytical). Kinematics of the rigid in particular motion (vector and analytical). The relative movement of the material and rigid point. Kinematics of body systems. Introduction to dynamics. The dynamics of the material point. Theorems used in the dynamics of the material point. The dynamics of the free material point and subject to connections. Dynamics of the relative motion of the point. Dynamics of material point systems and rigid. General theorems in the dynamics of material point systems and the rigid. Dynamics of the relative motion of material point systems or rigid relative to the center of gravity. Koening's theorems. The applications of kinematics and dynamics. Dynamics of impulsive movements. Shocks and percussions. Fundamentals of analytical mechanics. D'Alembert's principle. The principle of virtual mechanical work. Lagrange's equations. Seminar content: applications at courses content.	6
					Strength of materials I *The main objective of the course:* Familiarization of the future mechanical engineer with the main calculation tools, necessary for dimensioning, verification and loading capacity calculation of the strength structural elements. *The following topics are included:* - Introduction to Strength of Materials. Problems in Strength of Materials. Displacements, deformations, internal forces, stresses. Assumptions in Strength of Materials. Sectional efforts in bars. Sections method. Calculation of sectional efforts. Sign rule. Differential relationships between sectional efforts and loads. Methods of drawing sectional effort diagrams. Mobile concentrated forces. Lines of influence. - Static tensile testing of materials. General notions regarding on mechanical testing of materials. Tensile test diagram. Factors influencing the mechanical properties of materials. Permissible stresses. Tension and compression.	6

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Calculation relations for stresses and deformations. Dimensioning, verification, loading capacity. Calculation of vertical bars, taking into account their own weight. Statically indeterminate problems in tension and compression. Stresses caused by not allowed expansion or thermal contraction. Calculation of elastic wires. - Conventional shearing calculation. Formulas for stresses and deformations. Dimensioning, verification, loading capacity. Introduction to the calculation of joints. - Moments of inertia of plane figures. Definitions. Parallel axis theorem (Steiner's theorem). Variation of moments of inertia when rotating the coordinate axes. Principal axes, principal moments of inertia. Radius of gyration. - Torsion. Duality law of the shear stresses. Torsion of bars with circular sections. Torsion of rectangular bars and open profiles with thin walls. Torsion of thin-walled tubular bars. Bredt's formulas. Statically indeterminate problems in torsion. - Bending straight bars. Bending stresses. Navier's formula. Rational sections of bent bars and beams. Shearing stresses in bending. Juravski's formula. Longitudinal sliding and preventing it. Stresses in oblique bending and crooked bending. Stresses in bending of beams with non-homogeneous sections. Logitudinal sliding in beams with non-homogeneous sections and preventing it. *Practical works (Seminar):* - Axial forces, shear forces and bending moments diagrams in straight bars, curved bars, systems made up of straight bars and /or curves. - Problems, questions and comments related to bars which are loaded with axial forces (tension or compression). - Problems, questions and comments related to conventional shearing calculation. - Problems, questions and comments related to moments of inertia of plane figures. - Problems, questions and comments related to torsion (torsion of bars with circular sections, torsion of rectangular bars and open profiles with thin walls, torsion of thin-walled tubular bars, statically indeterminate problems	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					in torsion). - Problems, questions and comments related to bending (Navier's formula, rational sections in bending, Juravsky's formula, longitudinal sliding and preventing it, oblique bending and crooked bending, bending of beams with non-homogeneous sections, longitudinal sliding in beams with non-homogeneous sections and preventing it.) *Practical works (Laboratory):* - Safety norms in mechanical testing laboratories. The international system of units of measurement. - Tensile test diagram for ductile steel. - Verification of the straight bars in bending. - Verification of deformations in oblique bending. - Verification of the reciprocity theorem of displacements. - Steel resilience test. - Laboratory colloquium.	
					Thermotechnics Introduction into Thermodynamics; First Law of Thermodynamics; Ideal gases; Second Law of Thermodynamics; Methods of Thermodynamics; Third Law od Thermodinamics; Real Gases; Vapours; Humid Air; Refrigeration plants; Heat pumps; Heat transfer; Steam power plants; Steam boilers; Steam turbine; Power generation.	3
					Mechanisms I *Course content:* Structure and classification of mechanisms. Elements. Kinematic element. Kinematic chain. Kinematic couple. Mechanism. Determination of planar mechanism configurations. Structural groups. Family of mechanisms. Mechanism. Features. Kinematic analysis of plane mechanisms with joints. The bar method. General relations. Application of the principle. Calculation example. Kinematic analysis of plane mechanisms with sliders. The bar method. General relations. Application of the principle. Calculation example. Kinematic analysis of mechanisms. The polygonal contour method. The principle of calculation. Application of the principle. Calculation example. Kinematics of spatial mechanisms. Calculation principles. Examples of solving spatial mechanisms. Cardan joint. Synthesis of plane mechanisms with bars. General principles. Structural synthesis.	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Kinematic synthesis. Examples of mechanisms synthesis starting from different functional conditions. Determination of reactions in kinematic pairs. The connection between the class and the couple's time and the specific reactions introduced. Locking of mechanisms. Calculation example. Cam mechanisms. General. Analysis of cam mechanisms. Synthesis of cam mechanisms. Motion laws imposed. *The content of practical works:* Kinematic couples. Determining the positions of a complex mechanism by graphical methods. Synthesis of a quadrilateral mechanism based on three imposed positions. Synthesis of a cam with a cosinusoidal profile. Generation of gear wheels. Determining the parameters of a cylindrical gear with straight teeth. Gearboxes. Differential.	
					Physical Education and sport III Presentation of a minimal theoretical content aimed at the physical education activity. Consolidation of the main processes in fotbal-boys and voleyball-girls, known from previous cycles.	1
					Machine tools and machining by cutting Theoretical generation of surfaces. Generation of real surfaces on machine tools; Cinematic chains; Specific mechanisms widely used in the kinematic chains of machine tools; Mechanisms for adjusting the main kinematic chains; Mechanisms for adjusting the kinematic feed chains; Elements of the cutting tool; Lathe; Universal milling machine; Drilling, grinding, broaching machines.	5
					Ethics and Academic Integrity 1.Scientific research: Concept definition ; Teaching and research functions; Legislation of scientific research; The Ministry of research and innovation, the specialized body of the central public administration. 2. Standardization: Specific standards regarding the external evaluation of the study programs; Choosing the subject for the bachelor / dissertation work; Standards for drawing up character works scientific; Rules regarding the completion of studies; The structure of a scientific work; Citation and bibliography; Presentation of the paper; Multiple meanings of the licensing work and the one master's degree. 3. Ethics and ethics standards: The concept of ethics; Standards of ethics (morality); Ways to regulate ethics; Ethics in the University Charter and in	2

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					the Ethics Codes of national universities; The University Ethics Committee. 4. Code of ethics and academic deontology- Values of university ethical conduct: Academic freedom; Personal autonomy; Justice and fairness; Talent; Academic honesty and fairness intellectual; Transparency; Personal and professional responsibility; Respect and tolerance; Collegiality; Confidentiality. 5. Good practice in scientific research: Deviations provided in the University Codes of Ethics; Sanctions applied to violations of university ethics and good conduct in research. 6. Academic integrity: Concept; Clarification of the concept of academic; integrity as a result of the modification of the National Education Law no.1 / 2011; Academic integrity reflected in the Codes of ethics and integrity of universities; Integrity in the Code of ethics and the rules of professional conduct of ARACIS. 7. Checkout	
				4	**Technical Drawing and Infographic III** Introduction to 3D infographic. Specific drawing commands at sketch level. Specific editing commands at sketch level. Tools for creating 3D features. Comenzi de editare a caracteristicilor 3D. Controls for generating working features. Freeform surface generation and modeling commands. Freeform surface generation and modeling commands. Commands for obtaining execution drawings. Fine tricks commands. Commands used to obtain 3D assemblies.Design method "bottom-up" / "top-down". Recapitulative applications.	3
					Strength of materials II *The main objective of the course:* Familiarization of the future mechanical engineer with the main calculation tools, necessary for dimensioning, verification and loading capacity calculation of the strength structural elements. *The following topics are included:* - Deformations in beams and straight bars subjected to bending. The approximate differential equation of the deflection curve. Analytical integration of the approximate differential equation of the deflection curve. The method of reciprocal beams. The equation of the two anglles of rotations	6

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					and the equation of the two bending-deflections. The equation of the three bending moments (Clapeyron's equation). Deformation of beams subjected to oblique or crooked bending. Statically indeterminate problems in bending of beams and straight bars. - General state of stress and deformation. The state of plane stress. The spatial stress state. Relationships between displacements and deformations. The state of plane deformations. The spatial deformation state. The generalized Hooke's law. Deformation energy. The relation between Young modulus, modulus elasticity in shear and Poisson's ratio for isotropic and omogenous materials. - Failure theories. Classical failure theories. The application of failure theories to state of plane stress. - Combined loadings. Bending with traction or compression. Loadings that lead to shear stresses. Loadings that lead to normal and shear stresses. - Energy methods for calculating linear-elastic displacements. Potential energy of deformation. Clapeyron's theorem. Castigliano's theorems. The Mohr-Maxwell formula. The Vereshceaghin method. Theorems of reciprocity of deformation energy and displacements (Betti's theorem and Maxwrll's theorem). The canonical equations of the efforts method. - Curved bars. Curved bars in plane loaded in their plane. Helical springs with tight coils. - Elastic stability of slim straight bars. The critical loading of the straight bar subjected to axial compression. Euler's formula. The domain of validity of Euler's formula. Tetmajer-Iashinsky's formula for buckling in the elasto-plastic domain. Methods for solving buckling problems. - Dynamic loadings. Loadings due to forces of inertia. Shock loadings. The method of the impact multiplier ratio. - Notions for calculating flat plates. Bending of circular plates loaded symmetrically. Bending of rectangular plates which are supported on entire their contour and loaded uniformly distributed forces. Flat plates subjected to shock loading. - Revolution vessels with thin walls. Laplace's equation. Calculation of strength of thin-walled revolution vessels. - Tubes, spherical vessels with thick walls and rotating disks. Tube with	

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					internal and external pressure. Particular cases. Stresses produced by shrink fits. Spherical vessels with thick walls. Disk with constant thickness in rotational motion. - Notions about fatigue strength calculation. Classification of variable loadings. Fatigue strength. Diagrams of fatigue strength. Factors influencing for fatigue failure. Safety coefficient. *Practical works (Seminar):* - Problems, questions and comments related to deformations of the beams and straight bars subjected to bending. - Problems, questions and comments related to stresses and deformations in the general state of tension and deformation. - Problems, questions and comments related to bars subject to combined loadings. - Problems, questions and comments related to energetic methods of the deformations of the beams and straight bars subjected to bending. - Problems, questions and comments related to statically indeterminate systems made up of straight bars. - Problems, questions and comments related to curved bars. - Problems, questions and comments related to buckling of the slim straight bars in compression. - Problems, questions and comments related to strength structures subjected to dynamic loadings. - Problems, questions and comments related to flat plates. - Problems, questions and comments related to thin-walled revolution vessels. - Problems, questions and comments related to tubes, spheres with thick walls and rotating disks. - Problems, questions and comments related to fatigue.	
					Fluid mechanics I Introduction in fluid mechanics. Fluids physical properties. Fluid mechanics fundamental equations. General theory of static. The compressible fluids statics fundamental equation. Hydrostatic force over the flat area. General theory of kinematics. Kinetic notions and physical quantities. General equations of ideal fluid dynamics. Bernoulli's equation - Interpretation and	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					applications.	
					Finite element method *The main objective of the course:* Familiarization of the future mechanical engineer with the principles of applying the finite element method to the analysis of strength structures, while also seeking the creation of basic working skills, needed in the use of finite element analysis software environments. *The following topics are included:* - Introduction. Numerical methods dedicated to strength structures calculating, in the current context. Advantages and disadvantages of numerical methods dedicated to strength structures calculating. - Functionality of the finite element analysis software environments. Introduction. The internal architecture of the finite element analysis software environments. The main functionalities of the preprocessing module. The main functionalities of the post-processing module. Analysis reports. - The calculation model in mechanics of the strength structures. Introduction. The physical model of the strength structures. The mathematical model in mechanics of the strength structures. - The basis of the finite element method. Introduction. The stages of applying the finite element method. Classes of finite elements. Reference systems. Displacements and forces vectors. Interpolation functions. Natural coordinates. Local and global stiffness matrix. - Optimal modeling of the strength structures. Establishing the relevant results and the level of their accuracy. Adopting the appropriate material model. Simplifying the real geometry. - Analysis of the finite element analysis software adopted for practical works. Analysis of the opportunity to use a finite element analysis environment. Choosing the software solution and establishing the necessary hardware resources. Cost estimation (hardware costs, licensing costs, operating costs, etc.). *Practical works (Laboratory):* - Presentation of the finite element analysis platform and main operating tools and capabilities. - Analysis of the strength structures made of hinged bars in 2D (planar truss	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					structures). - Analysis of the strength structures made of hinged bars in 3D (spatial truss structures). - Analysis ot the strength structures made of rigidly connected bars. - Analysis of the strength structures assimilable to plates. - Analysis of massive strength structures. - Geometry import. - Simplification of the geometry of the strength structural elements. - Analysis of assemblies with parts in contact. - Post-processing the results and generating the analysis reports. - Notions regarding the analysis of the effects of the stresses concentrators. - Laboratory colloquium.	
					Mechanisms II *Course Content:* Balancing rotors. General balancing conditions. Rotor balancing theorem. Balancing shorts rotors. Dynamic balancing. Rotors balancing machines and devices. Balancing the cars. General principles. Examples of balancing mechanisms. Gear mechanisms. General. Principles of scoring. Kinematics of mechanisms with fixed and mobile axes. The fundamental theorem of gear. Curves. Evolution and its qualities. Gear kinematics. Reference rack. Continuity of gear. The degree of coverage. Moving profiles. Cylindrical gears with inclined teeth. Conical gear. Screw gear. Forces in gear. Energy balance of the mechanisms. Phases of machines movement. Study of the movement of machines and mechanisms. Reduction theorems. Integration of differential equations of mechanism movement. The uniformty of the movement of machines. Degree of non-uniformity. *The content of practical works:* Project theme presentation. Synthesis of the complex mechanism. Determining the main dimensions of the mechanism. Choosing standardized elements. Establishing kinematic calculation relationships. Realization of the numerical calculation algorithm. Realization of the numerical calculation program. Project presentation.	4
					Mechanical Vibration *The main objective of the course:* to acquire the necessary knowledge and skills for the calculation, design, execution and operation, as well as the	3

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					analysis and diagnosis of the vibration operated or disturbed elastic mechanical systems. *Course contents:* 1.Introductory elements in mechanical vibration; 2.Harmonic vibration kinematics; 3.Elements of dynamics of mechanical systems vibration; 4.Vibrations of 1DOF linear mechanical systems; 5.Vibrations of 2DOF linear mechanical systems; 6.Vibrations of the viscous-elastic rigid body modeled as 2DOF linear system; 7.Vibrations of nDOF linear mechanical systems; 8.Elements of vibration effects analysis and vibration protection. *Practical works (Seminar):* 1.Compound harmonic vibrations; 2.Calculus of equivalent elasticity coefficients of series and parallel springs. Calculus of the elastic coefficients of the tension-compression springs and torsion springs; 3.Calculus of the elasticity coefficients of the bending springs. Stability study of elastic mechanical systems 1DOF, 2DOF; 4.Free vibrations of 1DOF elastic systems: calculus of inertia and stiffness coefficients, calculus of eigenfrequncy, determination of the law of motion; 5.Forced vibrations of 1DOF elastic systems: laws of motion in case of harmonic and inertial type disturbance. Forced vibrations of the non-harmonic and polyharmonic perturbed 1DOF systems; 6.Structural characteristics of 2DOF elastic mechanical systems (inertia matrixx, stiffness matrix, eigenfrequencies, eigenvectors); 7.Forced vibrations of the 2DOF elastic mechanical systems: modal coordinates, orthogonality conditions, the amplitudes of the forced vibrations.	
					Physical Education and sport IV Settling in atack and defense game sistems. Billateral games. Development of the elements of coordinative capacity: rhythm, precision, combination of movements, ambydextry, agility. Educate the general force on the upper, lower limbs, abdomen and trunk by the method of working in the circuit an by working on workshops.	1
					Field practice Labor protection training, knowledge of the sectors of the company S.C.Promex S.A. and the organizational chart of the company. Obtaining the castings, forged, laminated, welded construction semi-finished products. Heat treatments for improvement, hardening, cement, nitriding, induction,	4

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					relief, annealing. Knowledge of mechanical processing sections and component workshops. Innovation, progress factor to obtain an optimum quality / price ratio. Closing the activity and granting the qualification.	
					Quality engineering Quality - objective of managerial activity; Defining quality. Basic concepts; Commitment to quality; Quality objectives; Quality implementation; The total quality system; Quality audit; The evolution of quality control; Statistical control; Total quality control; Competitive engineering. Flexible manufacturing; "Just in Time" technique. "Zero defects" technique; Quality control through three-dimensional control.	3
			4	**7**	**Tribology** Introduction (Definitions, short history. Objectives of tribology, Basic notions and concepts in tribology, General concepts regarding frictional couples); The complex process of friction (The importance of friction; Frictions Classification; Dry friction; Semifluid or mixed rubbing; Determining the conditions and areas of the boundary and mixed regimes; Fluid friction; Basic theoretical elements on hydrodynamic lubrication; The general form of the analytical expressions; Basic relations for hydrodynamic lubrication with liquids; Elastohydrodynamic regime; Thermal effects of friction; Tribological behavior of different materials; Plastic materials; Sintered materials; Composite materials; Metallic materials; Non-ferrous metals; Methods of hardening; Choice of materials and friction surfaces); Wear (General aspects; Friction-wear dependence; Wear types; Adhesion wear; Methods of calculating the adhesion wear; Applications of adhesion wear to metal processing; Abrasion wear; Calculation elements; Combating abrasion wear; Fatigue wear; Calculation of pitting wear at gears; Corrosion wear; Chemical corrosion; Mechanochemical (tribochemical) corrosion; Corrosion prevention; Other types of wear; Cavitation wear; Impact wear; Cold deformation; Hot deformation;) Lubrication (Liquid lubricants; Mineral oils; Synthetic oils; Physico-chemical and functional properties; Additives; Functional role. Classification; Mechanism of action of additives; Consistent greases; Vaseline; Solid lubricants; Conditions required for solid lubricants; The main types of solid lubricants; The elastohydrodynamic regimen).	4
					Production management	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Management: characteristics, principles, functions.The enterprise: production proces; material and human resources, production capacity. The research activity developement in the company. Internal and external enviroment of the enterprise. Efficiency of the enterprise: productivity and profit.	
					The Analysis of Structures Behavior *The main objective of the course*: adequately acquiring the specific principles, concepts, physical measures and engineering calculation skills, necessary for understanding and describing phenomena, processes, principles and methods related to modeling, simulation and analysis of structures behavior under various types of external loads. *The following topics are included*: Basics of computational models related to mechanical structures, Simplified SDoF and extended nDoF linear models, typically used in structures behavior analysis, The analysis of structural behavior under static loads, Dynamic loads usually used in structure behavior analysis, Structural stability, Modal analysis within structural dynamics characterization, External loads with random timed values and uncertainties within structures external charging. *Applied works (in-lab activity)*: Numerical examples and computational applications related to each previously presented topics.	3
					Machines and technological equipment for constructions II *The main objective of the course*: Developing the skills to identify, define and use concepts in the field of machine construction; Developing the ability to design action schemes for the working bodies of construction machines, to graphically dimension and represent benchmarks / subassemblies of their parts; Developing the ability to choose the machines and the working processes in correlation with the construction work that can be executed at an imposed level of quality and efficiency. *Couse contents:* Excavators with multibuckets. Scapers. Graders. Rollers for soil compaction. Demolition equipments for constructions. Multipurpose machines for contruction. Site management. *Practical works (project):* Project title - Design an working tool mounted on the multipurpose machine. *Written part content:* Cap.1 Aspects regarding on the digging soil process. The use og the multipurpose machines. Ilustration of the constructive, technical and functional caracteristics of multipurpose machines. Cap.2 Calcul of the main constructive, technical and functional	5

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					caracteristics of the multipurpose machine and working tool. Cap.3 Calculation of strength of metallic structure of the working tool. Cap.4 Dimensioning of the hydraulic cylinders for equipment action. *Drawing part content:* Ansamble of the multipurose machine. Working diagram. Main parts of working tool. Hydraulic scheme for drive system.	
					Technology for the manufacture, maintenance and repair of technological equipment General notions about manufacturing processes; Determining the elements necessary for drawing up technological processes; Shafts manufacturing technology; Bore processing technology; Technology for manufacturing complex parts; Thread processing technology; Technology of groove processing; Teeth processing technology; Technologies for processing by plastic deformation; Reconditioning of the technological equipment parts by reprocessing the repair size; Reconditioning of technological equipment parts by metallization; Methods and procedures for reconditioning parts by welding.	4
					Stations and equipments for concrete and asphaltic mixtures preparation *Topics:* Introduction (Quality of prepared materials. Quality of mineral aggregates. The brand of cement. Water quality. Quality of additives. Verification of the technical quality level of the processing equipment. Performance requirements imposed on concrete preparation equipment. Properties of fresh concrete. Properties of reinforced concrete. Quality of concrete); The mixing process and specific equipment; Component materials storage; Component materials dosing; Concrete preparation plants; Working technologies; Equipment for transporting and commissioning, with the possibility of improving and maintaining the concrete quality; Installations for asphalt mixturese preparation. *Laboratory:* Mixers, Dispensers, Deposits of aggregates, cement deposits. Working technologies, Concrete pumps. Mixers. Torch machines, Installations for the preparation of asphalt mixtures, with continuous operation.	3
					Internal-combustion engines (ICE)	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Course Content: Introductory notions. Classifications. Construction. Operating principles. Fuels. Ways of forming mixtures. Burning in ICE. Burning defects. The connection between combustion and pollution. ICE features. Conditions and means of determination. Legislation and norms. Construction of ICE elements. Construction of movable elements (piston group, connecting rod, crankshaft). Construction of fixed elements (crankcase, engine block, cylinder head, galleries). The auxiliary systems of ICE. Trends in evolution. The intake and exhaust systems. The fuel supply system. Filtration system. The lubrication system. The cooling system. The ICE as a source of pollution. Developments of ICE. Means to reduce the pollution produced by ICE. Constructive and functional solutions to reduce pollution. Installations and equipment for limiting pollutant emissions from exhaust gases of ICE. Catalytic systems. Gas recirculation valves. Lambda probe. Special injection systems. Classification of compressors. Volumetric compressors. Piston compressors. Rotary compressors. Dynamic compressors. Compressor applications. **The content of practical works**: Componentele ICE. Elemente mobile. Element fix. Sistem de distribuție a gazelor. Carburatoare. Pompe de injecție și injectoare de combustibil. Sisteme de lubrifiere și răcire ICE. Sistemul ICE de distribuție a gazelor. Mijloace de reducere a poluării produse de ICE.	
					Certification of technological processes, materials and equipment Requirements regarding the attestation of the technological processes, materials and equipment for the quality of the executed works. Safety, health and human protection requirements. Specific requirements for technologies, materials and equipment. Certification of the conformity of the quality of the technological processes using the technical approvals. Certification of conformity of the technological equipment by certification of conformity and application of the CE marking. Certification of the conformity of the technological equipment in operation and marketed at the second hand by carrying out the technical inspection of the third party, in order to extend the operating time. The impact of attesting the conformity of technologies and products on the economic efficiency.	3

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
				8	**Technologies, mechanization and computer management of construction works** *Topics:* Construction site and objective management, Construction works industrialization and mechanization, Technologies of mechanized execution, Extraction and processing of mineral aggregates for concrete, Complex mechanization of monolithic concrete works, Assembly and lifting technology for prefabricated elements, Construction works mechanization and technological programming. *Project* - Theme: Technology and mechanization of excavation works in narrow spaces using an automated system.	4
					Coupling and damping elements and systems Assemblies with elastic and damping elements: General considerations (definition and functional role; classification of springs; general conditions of material and technology; characteristic of springs); Bending springs; Springs with main torsional loads; Rubber springs. Coupling elements: General considerations; Permanent couplings: Permanent fixed (rigid) couplings; Couplings with bushing; Coupling sleeves; Couplings with flanges; Permanent mobile couplings (compensators) with rigid elements; Mobile permanent couplings with rigid elements for axial deviations (displacements) (clutch couplings); Permanent mobile couplings with rigid elements for radial deviations; Permanent movable couplings with rigid elements for angular deviations (displacements) (Cardan coupling); Permanent mobile couplings with rigid elements for combined deviations (displacements) (toothed couplings); Mobile permanent couplings with elastic elements; Elastic couplings with metallic elements; Elastic couplings with non-metallic elements; Intermittent Couplings.	4
					Machinery for special foundations and concrete *The following topics are included:* 1. Machines for the consolidation of earthworks and foundations. Machinery for earthworks and foundations. Classification and scope of use. The peculiarities of using machines for foundation work. Operating parameters and indicators. 2. Machines for digging rifles and holes for buried walls and piles. Deep digging equipment. Construction and operation of equipment. Calculation of	4

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					constructive and functional parameters. 3. Hole drilling machines for pilots molted directly on site. Rotary drilling equipment. Construction and operation of drilling machines. Calculation of constructive and functional parameters. 4. Working technologies for clamshell bucket and drilling machines. Working technologies. 5. Equipment for piling of the pilots. Hydraulic rams, pneumatic, diesel, sonnets with hydrostatic drive. Construction and operation of equipment for piling pilots. 6. Working technologies for pile driving machines. Working technologies for piling machines. 7. Vibratory equipment for sheet and piles driving. Construction and operation of equipment for sheet and piles driving. Calculation of constructive and functional parameters. Piling with vibration process. Influence of functional parameters on the piling with vibration. 8. Complex mechanization of reinforced concrete works *Practical works (Project):* 1. Determination of the technical and safety parameters of the pneumatic rotary hammer 2. Processing of the experimentally data on the pneumatic rotary hammer 3. Calculating of the productivity of earthworks and foundations machines 4. Analytical determination of the functional characteristics of the clamshell bucket.	
					Traction machines and systems *The following topics are included:* 1. General organization of traction machines and systems (TMS): Traction machines and trucks for assembling construction. Traction and transport machines for assembling construction. Schemes for the arrangement of traction equipment in motor vehicles on wheels. General conditions for the assemblies and mechanisms of traction machines. Special cars for the transport of technological machinery. Transport module. Trailers and semi-trailers used in the agabaritic transport of technological machinery. General organisation of traction machinery. 2. Main parameters of traction machines: Constructive parameters. The main dimensions. Weight and distribution on decks. Passing capacity. The power	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					parameters of the traction machine. The external speed feature of the internal combustion engine. Transmission efficiency. Vehicle speed 3. Cinematics and dynamics of the traction machine rolling system: Tyre construction. Tyre dimensions and wheel beams of the vehicle. The interaction between the tyre and the runway. Wheel kinematics. Tire-wheel dynamics. The balance of the motor wheel. The size of the force on the wheel. The free wheel balance. The braked wheel balance. Longitudinal adherence. Limitation by adherence of the moments and forces on the wheel vehicle. Rolling resistance force. Resistance torque on running. Rolling resistance coefficient. The slippage of motor wheels equipped with tyres. 4. The resistance forces to the movement of wheeled auto-vechicles. Calculation of dynamic reactions to axles and wheels TMS. Traction Balance of TMS: Rolling resistance force. Slope resistance force. Air friction force. Resistance in starting mode. Calculation of dynamic reactions to TMS axles and wheels. Traction balancec on TMS. 5. The main problems of traction and economy calculations of the TMS. Energy balance, energy characteristic of the TMS, equipped with tires wheels: Generalization. General equation of auto vechicles motion. 6. The main problems of traction and economy calculations of TMS. Dynamic and economic characteristic of TMS: braking of TMS and braking capacity parameters. Dynamic and economic characteristics of TMS. Dynamic characteristic of vehicles with mechanical transmission. The economic characteristic of auto vehicles. Braking of traction machines and parameters of braking capacity. The size of the braking force and its distribution on the axlis. Braking with the uncoupled engine. Braking capacity parameters. 7. The main problems of traction and economic calculation of the TMS. Efficiency of traction auto vehicles. Determination of M.S.T. weight: Efficiency of traction auto vehicles. Determining the weight of traction auto vehicles and transport systems. Determination of the weight of auto vehicles in traction mode. Determination of the weight of auto vehicles in transport mode. 8. The main problems of traction and economics calculation of TMS. The calculus of engine power and determination of its external characteristic.	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Determination of TMS's gear ratios, speeds and forces: Determination of gear ratios and speeds according to the geometric progression method. Determination of gear ratios and speeds according to the method of arithmetic progression and harmonic progression 9. Traction qualities of digging and transporting machines wheeled with tyres: Appreciation of the traction qualities of TMS. Drawing up the traction characteristic of TMS with mechanical transmission by analytical method. Drawing up the traction characteristic of TMS with hydromechanical transmission. Traction characteristics for special working regimes. Traction characteristics when auto vehicles moving in the ramp. Traction characteristics when the rolling resistance coefficient is variable. Traction characteristics of auto vehicles working in tandem with other vehicles. 10. Traction and economy calculus of TMS based on a two live axle tractor: Introduction. Traction calculus of two live axle tractors with mechanical transmission. Traction calculus of two live axle tractors with hydromechanical transmission. 11. Traction and economy calculus of TMS based on a single-live axle tractor: Introduction. Traction calculation of the single-live axle tractor with mechanical transmission. 4 x 2 self-screepers with mechanical transmission. Traction calculation of the single-live axle autoscreper with hydromechanical transmission – autoscreper of type 4 x 2. 12. The mannerability and stability of traction auto-vehicles. Longitudinal and transversal stability of TMS. Longitudinal stability of single vehicles. Longitudinal stability of railway vehicles. Transversal stability of single vehicles. Transversal stability of railway vehicles. *Practical works (Project):* 1. Labour protection. News in the construction of commercial vehicles. New trends in the construction of environmentally friendly vehicles and machinery for digging and transporting for construction. 2. Experimental determination of the constructiv parameters of auto vehicles. 3. Experimental determination of the resistance coefficient of free rolling forward. 4. Determination of the deformation characteristics of the tyres. Interaction between the tire and the non-deformable path. 5. Assessment of noise and	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					vibration pollution caused by deisplacement of traction machines and systems. 6. Clutches. Gearboxes. 7. Steering systems used in TMS. Braking systems used in TMS.	
					Maintenance and Reliability of Construction Machinery The discipline provides the necessary knowledge and skills in order to design any construction machinery with imposed lifetime. There are provided statistics basics elements and for the entire range of machine parts is presented a methodology for imposed lifetime calculus. In this respect, any tipe of construction machinery is considered like a complex sistem. In the end, the presented method is applied on a gearbox.	4
					Computer-assisted simulation of dynamic systems Concepts and notions in the field of dynamic systems behavior analysis. Introduction in the field of computer-assisted simulation of the behavior of dynamic systems. Elements of computer-aided engineering in the mechanics field. The specific issue of modeling, simulation and computer analysis of the dynamics of mechanical systems using Matlab/Simulink. Modeling of the mechanical system with 1DOF. Modeling of the mechanical system with 2DOF. Modeling of dynamic systems with variable mass. Elements of modeling the system-environment interaction. Characteristics of response to external actions.	4
					Road communication machines *Topics:* Road mills; Finishing partitions for asphalt mixtures; Finishing partitions for concrete; Compactors for asphalt mixtures and concrete; Bitumen road surfacing installations; Marking installations, signaling on the road surface. *Laboratory:* Road mills; Documentation achievement for the technical certification of the distributor – finisher; Analytical determination of the vibrator compactor functional parameters; Determining the productivity of machines and installations for road communications; Bitumen road surfacing installations; Marking installations, signaling on the road surface; Road segment execution technology.	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units

Study domain	Level (BA/MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Mechanical Engineering	MA	Computer-Assisted Analysis of the Technological Machines and Equipment Dynamics	1	I	**Equipment-medium Interaction and Dynamic Modeling** *The main objective of the course:* knowledge and proper use of the notions of interaction, equivalent dynamic model, equation of motion, dynamic coefficient; understanding and explaining the dynamic behavior of mechanical systems; use of the Matlab software package to solve discipline-specific requirements (evaluation of displacement-time, speed-time, acceleration-time, force-time, frequency spectra, hysteresis curves, etc.). *The following topics are included:* - concepts used in the field of mechanical behavior analysis; - principles of the analysis of the behavior of mechanical systems (generalities; analysis of the dynamic response of a system to external actions); - computer-aided engineering elements with MATLAB / SIMULINK software (generalities; particularities in modeling and computer simulation of the dynamics of the systems with Matlab / Simulink); - modeling of the mechanical systems with 1DOF (translation motion; rotational motion); - modeling of the mechanical systems with 2DOF (translation motions; rotational motions); - considerations about the study of interactions (introduction; algorithm for studying equipment-medium interactions); - modeling the wheel-road interaction in the case of mobile technological equipment (dynamic models with 1DOF, 2DOF, 3DOF); - modeling the interaction between the working tool-medium, in the case of mobile technological equipment (bucket loader-soil interaction; blade of the bulldozer / grader – soil interaction; vibratory pile equipment - soil interaction; vibratory roller – soil interaction). *Practical works:* virtual applications for modeling of the wheel-road interaction in the case of mobile technological equipment, and respectively, modeling the interaction between the working tool-medium, in the case of mobile technological equipment (bucket loader-soil interaction; blade of the bulldozer / grader – soil interaction; vibratory pile equipment - soil interaction; vibratory roller – soil interaction).	**4**
			1	I	**Dynamics Analysis of Components and Systems for Hydraulic Actuation** *The main objective of the course*: adequately acquiring the specific principles, concepts, physical measures and engineering calculation skills, necessary for understanding and describing phenomena, processes, principles and methods related to modeling, simulation and analysis of dynamics characterizing hydraulic actuation systems.	**4**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					The following topics are included: Fundamentals of modeling and simulation of hydraulic actuation systems, Mathematical models for hydraulic actuation systems, Dynamics modeling and analysis of dynamic performances for hydraulic equipments, Working with linear operational block diagram and transfer function acquiring for hydraulic actuation equipments, Mathematical modeling of hydraulic actuation systems. *Applied works (in-lab activity)*: Presentation of the software used in behavioral modeling and simulation of hydraulic actuation components and systems, Simulation of specific dynamics for an actuation system with rotation / linear motor based on ideal modeling elements, Implementation of the diagram for a primary energy source using the computational elements related to a hydrostatic pump with constant / variable displacement, Modeling and comparative analysis of implementation variants for hydraulic fluid distribution, Simulation of dynamic behavior for auxiliary components within a hydraulic actuation system, Simulation of dynamic behavior for a complex diagram of an hydraulic actuation system.	
			1	I	**Nonlinear and Random Vibration** *The main objective of the course*: adequately acquiring the specific principles, concepts, physical measures and engineering calculation skills, necessary for understanding and describing phenomena, processes, principles and methods related to modeling, simulation and analysis of dynamics characterizing nonlinear and random vibratory systems. *The following topics are included*: Analysis methods of nonlinear systems dynamic response, The analysis of vibration related to systems with known physical nonlinearities, Functional parameters for construction equipments with significant physical nonlinearities, Dynamics analysis of specific responses of the materials with physical nonlinearities (in terms of conservative and/or dissipative components), Random vibration (including specific distributions used within the area of random vibration, Stochastic processes, spectral density), The response of linear vibration systems to the random external perturbations. *Applied works (seminar activity)*: Analysis of systems with physical nonlinearities – typology study, Significant equations of motion, Analytical and approximate solutions, Computational (numerical) solutions, Spectral decomposition of conservative and dissipative forces, Dissipated energy, Specific models for systems with random external perturbations.	**4**
			1	I	**Assisted Graphics and Parametric Geometric Modeling** *General objective of the discipline:* acquire the necessary concepts and skills to use a computer-aided parametric modeling software and graphics in the mechanical field. *Course content:* -Overview of the Mechanical Desktop work window. -2D working tools from the "Design" pull-down. Tools for modifying 2D entities included in the	**4**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					"Modify" pull-down. -Visualization tools included in the "View" pull-down. -Additional visualization tools included in the "View" pull-down. -Tools for creating 3D surfaces. -Creation and working tools with "Part" type entities. -Annotation tools from the "Annotated" pull-down. -Tools to automatically create and edit 2D drawings.	
			1	I	**Ethics and Academic Integrity** *The main objective of the course:* adequately acquiring the specific concepts of ethics and academic integrity for their application in developing a responsible professional career. *The following topics are included:* -the themes, objectives and used methods in the study of ethics and academic integrity -violation of academic ethics (causes, examples of unethical academic behavior, ethical practices and dilemmas, vulnerability and risk in the university) -ethical issues in academic research (academic plagiarism, causes of plagiarism, ethics and integrity in scientific research) -academic research (data collection, publication and copyright, conflicts of interest, ways of citing APA and MLA, avoiding plagiarism) -intellectual property (definition, who owns the intellectual property, avoiding infringement of intellectual property rights) -institutionalization of ethics in the university and in the professional activity	**4**
			1	I	**Professional Internship 1** *Objectives (skills):* written and oral communication of the arguments, decisions and concrete steps in mechanical engineering; advanced use of the concepts for the exploitation of technological mechanical equipment; projects drawing-up using specific principles in mechanical engineering; defining, identifying and interpretation of complex problems specific in mechanical engineering; defining and identifying the concepts, theories and methods specific to software applications for computer-aided design, modeling, simulation and analysis of mechanical systems; use of techniques and specific software applications of concurrent engineering. *Project:* project theme (design / research-development-innovation); documentation (projects, books, specific legislation, journals, scientific papers, theses, aso.); current state-of-art (theoretical, technological, technical, experimental, numerical simulation) in project theme; directions of design and/or scientific research; professional internship report.	**10**
			1	II	**Optimization of Structures Using the Finite Element Method**	**5**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					The main objective of the course: acquiring the fundamental principles and notions specific to the optimization of mechanical structures in general, of resistance structures in particular. *The following topics are included:* - The mathematical model in the mechanics of structures. Stress state. Deformation state. Equilibrium equations. Constitutive equations. Compatibility equations. Deformation energy. Failure theories. - The basis of the finite element method. Finite element classes. The stages of applying the finite element method. Constitutive models. Boundary conditions. Reference systems. Interpolation functions. The fundamental equation of the finite element method. Stffness matrix of the finite element. The global stiffness matrix of the structure. - Optimal modelling of strength structures. The concept of optimal model with finite elements. Analysis of the real problem, adoption of working hypotheses and relevant results. Adopting the types of finite elements. Adopting the constitutive model. Modelling the boundary conditions. Adopt the appropriate analysis parameters. - Optimization of structures subjected to static actions, in the elastic domain of the material behaviour. Particularities of the static loaded structures, in the elastic domain of the material behaviour. Optimization criteria. Optimization criteria. Optimization using *Design Scenario* technique. - Optimization of structures subject to dynamic actions, in the elastic domain of the material behaviour. Particularities of the dynamically loaded structures, in the elasticdomain of the material behaviour. Types of the dynamic loadings. Optimization criteria. Optimization using *Design Scenario* technique. - Elements of structures optimization in the elasto-plastic and plastic domain of the material behaviour. Particularities of the structures statically loaded, in the elasto-plastic and plastic domain of the material behaviour. Idealization of the behaviour of materials in the eleasto-plastic and plastic domain. Optimization criteria. Optimization using *Design Scenario* technique. - Elements of multicriteria optimization in the design of structures. Coupled analysis (multi-physics analysis). Optimization criteria. Optimization using *Design Scenario* technique. - Optimization of structures using MES (Mechanical Event Simulation) technique. Basics of simulation of mechanical events. Real problems can be addressed through the MES technique. Choosing and imposing the relevant simulation parameters. Choosing and imposing the solving parameters of the numerical calculation model associated with the finite element model. *Practical works (Laboratory):* - Analysis of planar and spatial structures with bars. - Analysis of structural elements similar to plates. - Analysis of massive structural elements. - CAD-FEA interoperability.	

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					- Optimization of structures subjected to static loadings, in the elastic domain of the material behaviour. - Optimization of structures subject to dynamic actions, in the elastic domain of the material behaviour. - Optimization of structures in the field of elasto-plastic and plastic domain of the material behaviour. - Elements of multicriteria optimization in the design of structures. - Structural optimization using the MES technique.	
			1	II	**Dynamic Analysis of Lifting and Transporting Machines** *The main objective of the course*: building and functioning knowledge for different categories of lifting and transporting machines, effective use of technical documentation, modeling and virtual instrumentation algorithms, developing and using the machine dynamics software, applications on lifting machines parts, dynamics coefficients evaluation, scientific environment development considering expertise and trends in virtual instrumentation, research and design *The following topics are included:* -dynamics of lifting and descending mechanisms including flexible elements, elastic nonlinear element (cable) with non-linear and distributed dumping, extending-relaxing diagram, cable and suspended weight oscillators, hysteresis, start-stop pulley dynamics, lifting and descending cases, physics and mathematical simulations, elevator mechanisms dynamics, different gears mechanisms, movement stability, optimization, extreme situations, bucket elevator dynamics -arm movement mechanisms dynamics, simple and complex mathematical models and physics, engine-transmission-driving mechanism-arm-vertical movement distribution mechanism -self powered carriage dynamics, rigid and elastic transmission carriages, transmission parts deformation, starting, gearing and sliding, movement stability -spinning mechanisms dynamics, fixed and spinning tower mechanisms, lower or upper (spinning head) gearing -crane stability, rolling-spinning cranes, static stability with or without weight, stability coefficient, regular and accidental stress dynamics, general stability, mechanical energy evaluation -rolling beams and bridges dynamics, regular and accidental static and dynamic stress, mathematical simulation and physics, jointing elements reaction -inertial transporting systems dynamics, vertical and horizontal transportation, mathematical models and physics, movement law conclusion *Practical works (Seminar):* cables and pulley dynamic (virtual stand research), moving and spinning cranes dynamics (virtual stand research), crane stability (virtual stand research), elevators and conveyors dynamics (virtual stand research), rolling bridge dynamics (virtual stand research), vertical and horizontal inertial transporting systems (virtual stand research), inertial vehicles (virtual stand research)	**5**
			1	II	**Information Systems for Organological and Systemic Design**	**5**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					*General objective of the discipline: a*cquiring the concepts and skills needed to use a computer-aided design software in the mechanical field based on respecting the principle of competing engineering. *Course content:* - Making sketches and profiles. - Modeling of curves and surfaces. - Generation of solid type models. - Technological design of sheet metal parts. . Obtaining solid or sheet assemblies. - Drawing with Solid Edge.	
			1	II	**Dynamic Analysis of Vibrating and Shock Machines** *The main objective of the course:* learning principles, concepts and specific engineering calculation skills necessary for understanding and describing phenomena, processes, principles and methods of analysis, dynamic calculation and design of vibrating and/or shock machinery and technological equipment. *The following topics are included:* -specific requirements of vibrating and shock machines (capability, technological processes, classification of vibrating and shock machines, conceptual problems and stages of study on vibrating and shock machines, structural and functional analysis of vibrating and shock machines and dynamic modeling, dynamic performance regime, technological performance, security performance, optimal regimes of stability and technological efficiency -dynamics and calculation of fresh concrete compaction equipment (external vibrators, interior vibrators, vibrating tables) -ddynamics of vibrating conveyors (horizontal/inclined vibrating conveyors, vertical vibrating conveyors - helical vibrating conveyors) -dynamics of vibrating machines for sorting granular materials (bimasic vibrating sieves in resonance, inertial vibrating sieves) -dynamics of vibrating machines for compacting earth and road structures (nonlinearity analysis in the compaction process - calculation models, dynamic response, energy effects, dynamics of vibrating blades, dynamics of vibrating plate compactors, dynamics of the pulled vibrating compactors, dynamics of self-propelled vibrating compactors with a single vibrating roller, ynamics of self-propelled vibrating compactors with two vibrating rollers) -dynamics of vibrating hammers and extraction machines for foundation (construction and field of use, particularities of the vibration insertion process, dynamic calculation for vibrating hammers) *Practical works (Project):* project theme and individual parameters, analysis of the technical and technological solutions of the vibrating equipment, analysis of the vibrogenerators, calculus of the elastic	**5**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					support system and vibrogenerator parameters, dynamic modeling (physical, mathematical) of the equipment, dynamic parameters for the 1DOF model, dynamic parameters for the models with the structural symmetries of the equipment, models with decoupled subsystems with coupled motions (1DOF, 2DOF, 3DOF, 6DOF models), natural modes (eigenfrequencies, eigenvectors), dynamic response curves.	
			1	II	**Professional Internship 2** *Objectives (skills):* written and oral communication of the arguments, decisions and concrete steps in mechanical engineering; advanced use of the concepts for the exploitation of technological mechanical equipment; projects drawing-up using specific principles in mechanical engineering; defining, identifying and interpretation of complex problems specific in mechanical engineering; defining and identifying the concepts, theories and methods specific to software applications for computer-aided design, modeling, simulation and analysis of mechanical systems; use of techniques and specific software applications of concurrent engineering. *Project:* selection of the theoretical and practical methods applicable in the area of the project theme; analysis and selection of technological design and/or investigation applicable methods; analysis and selection of design methods and numerical and/or experimental modeling applicable methods; analysis of the capabilities of design and numerical investigation, technological investigation and experimental investigation of "Dunărea de Jos" University; professional internship report.	**10**
			2	I	**Dynamics of Earthmoving and Foundations Equipments** *The main objective of the course*: adequately acquiring the specific principles, concepts, physical measures and engineering calculation skills, necessary for understanding and describing phenomena, processes, principles and methods related to modeling, simulation and analysis of dynamics characterizing embankments and foundations equipments. *The following topics are included*: Introductory elements (including basics of embankment and foundation equipments driving systems, block diagram of an equipment for embankment and foundation works with hydrostatic and hydro-mechanical driving system, elements of computational dynamics), Dynamic models for embankment and foundation equipments, Specific dynamic models for mechanisms within embankment and foundation machines, Dynamic loads on clutch and brake coupling at embankment and foundation equipments, Dynamic models for singe bucket excavators mechanisms, Specific dynamics of multiple buckets excavators with main application to radial digging excavators, Dynamic loads for the front loading equipment on the ramp displacement and on the arm moving down with charged bucket respectively, Dynamics of technological equipments for terrain compaction, Dynamics of technological equipments for pile driving and terrain stabilization, Dynamic loads within bulldozer structure.	**4**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Practical works (Project): Presentation of the project theme and setting of individual values for essential parameters, Elaboration of computational application for modeling and simulation, Dynamic characteristics evaluation, Comparative analysis of typical results, Verification and validation of the results conformity, Optimal solution adopting, final concluding remarks formulation and finalizing the project (followed by handing and presentation).	
			2	I	**Dynamics of Recycling of Construction Materials Machines** *The main objective of the course:* the transmission of the knowledge necessary to provide a coherent and complete reasoning on technologies and equipment specific to the recycling of construction materials, highlighting dynamic aspects and methods of modeling and simulation with numerical computing systems and specialized software packages. *The following topics are included:* - introduction in waste management, recycling of waste, the advantages and disadvantages of recycling, product lifecycle stages - analysis of factors influencing sustainable development, about the demographic evolution of the world and the decline of species, the international debates on sustainable development. - the effects of mechanical vibration, the vibration influence on the human factor, effects of the vibrations influence, with general action, transmitted to the whole body, minimum safety and health requirements relating to workers' exposure to vibration risks - aspects of dynamic system modeling, system with elastic support, system with viscoelastic support, system with elastic support and coulomb damping, systems with two degrees of freedom, systems with three degrees of freedom, the rigid model with triortogonal viscoelastic connections - structural and functional analysis of elastic support systems for machine foundations, elastic metal elements, rubber insulators and elastomers, ways of placing the insulation systems, installation of vibration isolation systems with metal springs, mounting of vibration insulation systems with metal springs and external damping elements - analysis of dynamic parameters in inertial vibrating screens, dynamic parameters of vibrating screens., physical modeling mathematical modeling, analysis of the dynamic regime of inertial vibrating screens, according to the damping capacity of the supports system, the case of the insulation system without damping, the case of the insulation system with damping, graphical representation of dynamic parameters - aspects of the dynamics of the vibrating vibrator with resonance function, operation of the vibrating screen in pre-resonance mode, operation of the vibrating screen in post-resonance mode, physical model of the vibrating screen with resonant function, the mathematical model, study of the vibration kinematic parameters of the vibrating screen with resonance function - dynamic analysis of drop hammer for brake cast iron, physical and mathematical modeling of sonnets,	**4**

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					determination of brake force parameters, quantitative evaluation of the dynamic response of the system, influence of nonlinear characteristic of viscoelastic systems on the dynamic behavior of drop hammer - analysis of the dynamic behavior of eccentric vibrating mills, elaboration of the dynamic model of eccentric vibrating mills, influence of nonlinear behavior of elastic support systems on kinematic parameters of vibrations and quality of the technological process - effect of obstacles in the road profile on the dynamic response of a vehicle, dynamic modeling of the interaction between the truck wheel and obstacles in the road, modeling the vehicle as rigid with two degrees of freedom, dynamic analysis of a truck when crossing the obstacle - dynamics of hydraulic cylinders, structural and functional analysis of hydraulic cylinders, dynamic modeling and analysis of the dynamic performance of the hydraulic cylinder, dynamic performance analysis *Practical works (Project):* Global warming vs. Global damming, recycling of materials from construction and demolition, vibrating screens, girational vibrating screens, inertial vibrating screens with circular oscillations, inertia screens with linear oscillations, the sonic screens, calculation of the anti-vibrating insulation system for inertial vibrating screens, analysis of impulsive excitation demands of machine foundations, the influence of periodic and non-periodic signals applied on a system with a degree and two degree of freedom on dynamic response, grinding mills, shredding mechanisms, classification of shredding machines, the main types of vibrating mills, dynamic computing elements for vibrating mills, study of dynamic parameters in vibrating mills for grinding granular materials, parameters of the anti-vibration insulation system	
			2	I	**Experimental Research Procedures** *The main objective of the course*: adequately acquiring the specific principles, concepts, physical measures and engineering calculation skills, necessary for understanding and describing phenomena, processes, principles and methods related to procedural experimental evaluation and analysis of technical systems. *The following topics are included*: Main definitions of measurements (including measures/sizes, units systems, rules for decimal multiples and submultiples of basic IS units, measurement basics, tools, categories and methods, etalon units, measure values and errors), General principles of measurement (including operations, classifications, basic diagram of measurement systems, transducers, measured and associated variables, perturbations, noise), Performances of measurement systems (including static and dynamic performances, measurement domain, calibration, sensibility, linearity, resolution, mobility threshold, hysteresis, precision), Principles and methods for experimental research of displacement, velocity, acceleration, strain, stress, vibration, noise and acoustics, main parameters within hydraulic and pneumatic actuation systems, dynamic, gravimetric, inertial and energetically parameters of machines and	**4**

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					equipments (including specific measures and units, transducers, constructive principles, methods, techniques, available equipments and apparatus, Regulations, admissible levels). *Applied works (in-lab activity)*: Principles, methods, acquisition and processing equipments for experimental datum, calibration procedures, Introduction to virtual instrumentation and computer-assisted experimental research, The experiment protocol, Experimental evaluation of forces, linear and angular displacements and velocities, vibration and noise parameters.	
			2	I	**Noise and vibration control** *The main objective of the course:* acquiring the principles, notions and specific engineering skills necessary to understand and describe the phenomena, processes, principles and methods of noise and vibration control and combating noise and shocks and vibrations pollution. *The following topics are included:* -elements of technical acoustics (acoustic waves - sound, speed of sound, wavelength, acoustic pressure and intensity, characteristics of a sound source, acoustic level, propagation of sound waves outdoors, the speed of sound in the air, sound attenuation in the air) -elements of physiological acoustics (harmful effect of noise on the human body, audibility area, sound levels, harmful actions of noise, normatives on permissible noise levels) -noise control methods (sources of noise, noise reduction through active and/or passive protection measures, absorption of sound waves, reflection of sound waves, soundproofing of noisy rooms, criteria for noise absorption, porous absorption, resonant absorption, cases and noise attenuators) -industrial noise control (reducing the level of noise produced by bearings and gears, reducing the noise level produced by blowers and turbos, noise reduction produced by electric equipment, reducing the noise level produced by different technological processes, soundproofing treatments) -foundations and vibration insulation of machines (construction and placement of machine foundations, causes of machine vibration, critical rotor speed, vibration isolators, dynamic models for foundations) -vibration isolation elements (steel springs, vibration insulators with steel springs, rubber insulators and elastomers, calculation of vibration insulating systems with rubber elements) -construction and calculus of the machine foundations with vibration isolation systems (general principles for designing machine foundations, materials used for the components of machine foundations, recommendations regarding the dynamic calculation of machine foundations) -influence of vibrations on the human and the level of performance of the machines (physiological and pathological effects of the vibrations on the human, evaluation of the effect of the vibration action on the human, normatives on the effect of vibration on human, effect of vibrations on technological performance and reliability, normatives on the effect of vibration on technological equipment) *Practical works (Project):* project theme and individual parameters, dynamic/acoustic characteristics	**4**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					calculation, vibration/noise isolation conformity assessment, comparative analysis of the systems for vibration/sound insulation, conformity of insulation at structural noises, optimal solution (technical, technological).	
			2	I	**Managing the Research, Development and Innovation Activities** The present course realises a complex analysis for the research activities. Thirst of all is it proposed a general methodology to approach any research subject. Research may be considered a range of activities developed in order to get a new product the it is considered an innovation or an invention. In this respect there are presented, one by one, all the activities that compose a research. As a completion there are presented all the European and Romanian legal reglementations	**4**
			2	I	**Professional Internship 3** *Objectives (skills):* written and oral communication of the arguments, decisions and concrete steps in mechanical engineering; advanced use of the concepts for the exploitation of technological mechanical equipment; projects drawing-up using specific principles in mechanical engineering; defining, identifying and interpretation of complex problems specific in mechanical engineering; defining and identifying the concepts, theories and methods specific to software applications for computer-aided design, modeling, simulation and analysis of mechanical systems; use of techniques and specific software applications of concurrent engineering. *Project:* physical modeling; theoretical (mathematical) model, theoretical results; numerical modeling and virtual models draw up using specialized software; numerical model analysis, numerical results; technological modeling, technological results; comparative analysis of results on virtual dynamic models; experimental modeling, analysis of experimental results; professional internship report.	**10**
			2	II	**Design Internship** *Objectives (skills):* written and oral communication of the arguments, decisions and concrete steps in mechanical engineering; advanced use of the concepts for the exploitation of technological mechanical equipment; projects drawing-up using specific principles in mechanical engineering; defining, identifying and interpretation of complex problems specific in mechanical engineering; defining and identifying the concepts, theories and methods specific to software applications for computer-aided design, modeling, simulation and analysis of mechanical systems; use of techniques and specific software applications of concurrent engineering. *Project:* comparative analysis of theoretical numerical technological and/or experimental results; analysis of innovative solutions applied in theoretical, numerical, technological and/or experimental modeling; analysis of the optimal solutions applied applicable in solving the problem of the design theme; conclusions and future directions applicable in solving the problem of the design/RDI theme; professional internship report.	**15**

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Study domain	Level (BA/ MA)	Study programme	Study year	Semes ter	Course title and brief description	Credit units
			2	II	**Master Thesis Draw-up** *Objectives (skills):* written and oral communication of the arguments, decisions and concrete steps in mechanical engineering; advanced use of the concepts for the exploitation of technological mechanical equipment; projects drawing-up using specific principles in mechanical engineering; defining, identifying and interpretation of complex problems specific in mechanical engineering; defining and identifying the concepts, theories and methods specific to software applications for computer-aided design, modeling, simulation and analysis of mechanical systems; use of techniques and specific software applications of concurrent engineering. *The dissertation paper main chapters:* -Formulation of the design/RDI theme; -State-of-art in thesis theme (bibliographic study); -Theoretical, numerical, experimental, technological study methods applied; -Theoretical, numerical, experimental, technological models developed; case studies; -Conclusions of theoretical, numerical, experimental and technological researches -References	**15**
					Total credits	**60**

Study domain	Level (BA/MA)	Study program	Study year	Semester	Course title and brief description	Credit units
Environmental Engineering	MA	Engineering and Environmental Protection	1	I	**Modern methods of environmental monitoring** The environment: problems and solutions. Impact of human activities on the environment. The environmental quality model. Principles and methods for measuring environmental parameters. Devices and equipment is the measurement of environmental parameters. Acquisition and processing of environmental data. Sound and vibration pollution. Environmental policy of the National Energy Authority.	4
					Methods to prevent pollution Main pollutants. Technological processes in the extractive industry, pollutants and prevention techniques. Industrial waste management with PCB content and other similar compounds. Industrial waste management in the steel industry. Management of industrial waste containing asbestos. Industrial waste management in the energy industry. Industrial waste management in the galvanic industry and in the processes of coating and treating metallic surfaces. The steps of implementing the prevention plan. Integrated Pollution Prevention and Control (IPPC). Large combustion plants. Environmental legislation.	4
					Advanced physical methods for wastewaters purification Classification and characterization of wastewaters. Advanced purification of wastewaters – basic	4

Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					principles. Classification of advanced methods for wastewaters purification. Separation of fine particles by filtration. Separation of impurities by membranes. Methods of advanced wastewaters purification which use the phases transfer. Methods of advanced wastewaters purification for removal of nitrogen and phosphorus compounds. Removing of pathogen bacteria (disinfection of wastewaters). Special procedures for advanced wastewaters purification.	
					The Radiation Pollution's Protection Radiation protection history. Sizes of radioactivity. Dosimetry; dosimetric sizes. The use of radioactivity in economic activities. Radiation protection. X-ray generator. Closed sources. Regulations and specific legislation. Gamma spectrometry.	4
					Ethics and academic integrity Scientific research. **Standardization.** Ethics and ethics standards. Code of ethics and academic deontology. Good practice in scientific research. Academic integrity. Verification (check/control).	4
					Professional practice I Presentation of the theme in the field of environmental protection. The current state of the research area. The purpose of the case study. Requirements and objectives of the paper. Presentation of technology and equipment to solve the environmental problem according to the dissertation theme. Conclusions. Practice report	10
			1	II	**Rehabilitation of areas bordering polluting industrial units** Environmental protection in the concept of sustainable development. Pollution. The influence of the activity of the pollutants industrial units on the border areas. The influence of units in the steel industry and of the non-ferrous metals on the border areas. The influence of units in the extractive industry on the border areas. The influence of units in the chemical industry on the border areas. The influence of units in the construction materials industry on the border areas. The influence of units in the thermal energy industry on the border areas. The influence of industrial activity on environmental factors in the border areas. The air pollution. The water pollution. The soil pollution. The biosphere pollution. Correlation between the objectives of environmental protection, theory and economic practice. Correlation between economic development and environmental protection, public health, education and culture. Environmental legislation.	4
					Technologies and equipment for neutralizing of pollutant residues Methods for treatment/neutralizing of pollutant residues: preliminary treatment methods, physical, chemical, thermal, biological, mechanic-biological treatments methods. Processing and treatment of sludge from wastewater treatment plants. Processing and treatment of waste from the processes of fuels obtaining (thermoelectric power stations). Processing and treatment of waste from waste incineration processes. Processing and treatment of metallurgical residues. Processing and treatment of residues from the extractive, cox- chemical and oil industry. Specific legislation in the field of waste / pollutant management.	6

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					Design of technological enclosures with a clean and controlled atmosphere History of clean room technologies. Classes and standards of clean rooms. Suite of clean rooms. Clean rooms used in various industries. Bases and conditions of calculation of ventilation and air conditioning installations. Indoor air calculation parameters; humid air. Methods for quantifying air emissions. Procedures for reducing dust concentrations.	5
					Techniques for retaining pollutants at source Current issues of the environment - human impact in the biosphere. General notions about ecosystems. Environmental pollution-polluting agents, natural and anthropogenic sources of pollution. Atmospheric pollution - prevention of air pollution. Pollution of soil and groundwater. Prevention of pollution of soils and groundwater. Basic property of some pollutants. Pollutant migration. Waste collection and recycling. Technological methods of filtering the flue gases of smoke stores. Technological methods of filtering the water plant.	5
					Professional practice II Selection of theoretical research methods applicable to the dissertation topic. Analysis and selection of the technological research methods applicable in the field of the dissertation topic. Analysis and selection of modeling and / or experimental methods applicable in the area of investigation of the dissertation topic. Analysis of the technological and experimental investigation capabilities of the „Dunărea de Jos" University in Galaţi or economic agents, in the field of the dissertation topic. Report of professional practice.	10
			2	I	**Environmental policies and strategies** The economy of the environment. Introductory notes. Environmental policy within the European Union. Environmental policy within Romania. Institutional framework. Institutionalized bodies. Environmental monitoring. Protection of environmental factors. Waste, management and control.	4
					Management of Research, Development, Innovation activities (RDI) Elements of the theory of strategic management, the orientation towards the component Scientific-Development (R&D). Elements of physiological acoustics. The complexity of the research and development (R&D) activity. Innovation management. The interdisciplinary approach of scientific and technical creativity. Legislation and research-development-innovation process. The policy of scientific research in Romania. The risk of scientific research projects. Marketing research. Financing of the research activity.	4
					Industrial waste management Getting started with waste management. Analysis of some influencing factors of sustainable development. Sustainable development, a necessity of contemporary society. The post-December Romanian industry. Industrial waste. Waste management containing asbestos. PCB management. Aspects regarding the	4

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					recovery of ash from thermal power plants. Possibilities of exploitation of the steel slags. Possibilities of recovering the textile materials. Sludge management from wastewater treatment. Waste disposal. Waste incineration. Dispersion of pollutants from combustion installations.	
					Clean technologies applicable in industry General characteristics regarding secondary resources. Evaluation of the limits of capitalization of secondary energy resources. Directions of recovery of secondary energy resources. Efficient use of secondary energy resources. Recovery of secondary energy resources in the form of combustion gases. Recovery of secondary energy resources of overpressure. Recovery of secondary fuel energy resources. Recovery of low temperature secondary energy resources. Recovery of household waste for energy production. Recovery of secondary plastics. Recovery of secondary plastics from used objects. Recovery of secondary elastomeric materials. Chemical processes for capitalization of secondary polymeric resources. The alternative of renewable sources, the important component of sustainable energy development.	4
					Management of emergency situations Natural and technological disasters. Disaster impact. Risk issues and vulnerabilities, risk reduction strategies and programs. The national emergency management system. The normative framework regarding the management of emergency situations. Authorities attributions. The attributions of international and non-governmental organizations. International cooperation and humanitarian assistance in emergencies. Protective measures and rules of behavior in emergencies. Nuclear chemical and biological protection. Types of risk in Romania. Final conclusions.	4
					Professional practice III Analysis of environmental legislation on the topic of the dissertation project. Analysis of environmental management systems on the topic of the dissertation project. Study visits to economic agents facing the environmental problem set out in the dissertation topic. Making a report on the environmental impact on the topic of the dissertation project. Preparation of a security report on the dissertation topic. Practice report.	10
			2	II	**Professional practice IV** Comparative analysis of theoretical, numerical, technological and / or experimental results; transposition of the results into the RID project. Analysis of innovative solutions applied in theoretical, numerical, technological and / or experimental modeling; transposition of the results into the RID project. Analysis of the optimal solutions applied / applicable in solving the problem of the design theme / RID. The conclusions of theoretical, numerical, technological and / or experimental research; transposition of the results into the design activity or RID. Future directions applicable in solving the problem of the design theme / RID. Practice report.	15
					Practice for the elaboration and completion of the dissertation paper	15

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Study domain	Level (BA/ MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
					What is a dissertation paper. The general framework. The framework content of a dissertation paper. Content presentation. Graphics, exposure, presentation. The conduct and structure of the presentation. Criteria for appreciation of the dissertation paper. Structural recommendations. Appendix.	