

Domain of study	Level (BA/MA)	Study programme	Year of study	Semester	Course title	Credit units
Food Engineering	BA	Food Engineering	I	1	Mathematical Analysis (1. Single variable calculus. Set of real numbers. Concepts of function, limits and continuity. Sequences of real numbers. Series of real numbers. Convergence. Differentiation of real valued functions. Application to Graphing, Approximations, and Extremum Problems. Definite and Indefinite Integration. Techniques of Integration. Applications to Geometry: Area, Volume, and Arc Length. Series of real valued functions. Convergence. Power series. Representation of functions as a power series. Improper Integrals. Integrals with parameters. Euler's functions gamma and beta. 2. Multivariable calculus. Functions of Several Variables. Limits and Continuity. Partial derivatives. Differentiability. The Chain Rule. Higher order derivatives. Maxima and minima of the functions with n variables. 3. Differential equations. First-order differential equations. Cauchy problem. Higher order differential equations with constant coefficients. Cauchy problem. Linear systems of differential equations with constants coefficients. General solution. Cauchy problem.)	4
Food Engineering	BA	Food Engineering	I	1	Inorganic and analytical chemistry (Introduction to the study of chemical analysis; Instruments of Analytical Chemistry; Classical methods. Qualitative analysis . Chemical tests. Proton exchange reactions. Concentration of H ₃ O ⁺ in acid and base solutions. Strength of acids and bases in aqueous solutions. Heterogeneous equilibrium. Precipitates. Hydrolysis of salts. Buffer solutions. Ampholytes. Electronic exchange analytical reactions. Quantitative chemical analysis. Gravimetric Analysis. Volumetric Analysis. Titration. Standards. Acid-base volumetric. Applications. Volumetry through redox reactions. Complex combinations with inorganic reagents. Complexonometry. Quality of analytical results. Errors. Instrumental methods. Analytical quality control. Practical exercise.)	5
Food Engineering	BA	Food Engineering	I	1	Organic chemistry I (Introduction. History. Structure of organic compounds. Chemical bonds in organic chemistry. Hybridization. Geometry of organic molecules. The polarity of the covalent bond. The dipole moment. Electronic effects in organic molecules (inductive and electromer effect). Isomerism of organic compounds. Constitution isomerism (chain, position, valence, tautomerism, compensation). Stereoisomerism (conformational and configuration). General information on the reactions of organic compounds. Homolytic and heterolytic reactions. Types of reactants and types of organic chemical reactions. Unstable carbon intermediates in organic reactions. Classification of organic compounds. Series homologous. Saturated acyclic and cyclic hydrocarbons - nomenclature, structure, isomerism, physical, spectral and chemical properties, representatives. Unsaturated hydrocarbons. Alkene - nomenclature, structure, isomerism, physical, spectral and chemical properties, representatives. Alkynes - nomenclature, structure, isomerism, physical, spectral and chemical properties, representatives. Alcadiene and polyene - nomenclature, structure, isomerism, physical, spectral and chemical properties, representatives. Mononuclear and polynuclear aromatic hydrocarbons. Nomenclature, structure, aromatic character, physical, spectral and chemical properties, representatives. Halogen compounds - nomenclature, structure, isomerism, physical and chemical properties, representatives. Hydroxy combinations I: alcohols - nomenclature, structure, isomerism, physical and chemical properties, representatives. Hydroxy combinations II: phenols - nomenclature, structure, isomerism, physical and chemical properties, representatives. Ethers, hydroperoxides and peroxides - nomenclature, structure, isomerism, physical and chemical properties, representatives. Sulfur compounds. Organic compounds with simple nitrogen functions. Amines and nitro derivatives: nomenclature, structure, isomerism, physical and chemical properties, representatives. Biogenic amines. Carbonyl compounds: nomenclature, structure, isomerism, physical and chemical properties, representatives)	4
Food Engineering	BA	Food Engineering	I	1	Physical and colloid chemistry (1. Introduction to Physical Chemistry. Aggregation states. Microscopic and macroscopic properties. 2. Thermodynamics of chemical and biochemical processes: thermodynamic measures, enthalpy, entropy, Gibbs energy. 3. Physical equilibria: ideal solutions, real solutions, boiling, melting, solvent extraction. 4. Chemical equilibrium: equilibrium	5

					conditions, equilibrium constant, chemical equilibrium shift. 5. Electrochemistry and corrosion 6. Kinetics of chemical and biochemical processes: kinetic parameters, kinetic equations. 7. Electrochemical processes and corrosion. 8. Interphase phenomena: interphase, surface tension, adsorption. 9. Colloidal systems: definition, classification, preparation. 10. Molecular kinetic properties of disperse systems. 11. Optical properties of disperse systems. 12. Electrical properties of disperse systems. 13. Stability of disperse systems. 14. Food disperse systems: emulsions, foams, gels, suspensions)	
Food Engineering	BA	Food Engineering	I	1	Applied IT (Historic. IT systems. Types of computers. Computer structure. Hardware. Software. Microsoft Word text editor: presentation, create a new document, functions, graphs. Writing a scientific text. Introduction in Matlab. Structure of Matlab system. Launch / Exit from program. Functions. Work windows. Elements of graphics 2D and 3D in Matlab. The graph of two variables in MATLAB. The addition of more variables in the diagram. Change the chart type. Creating Surface graphs in Matlab and Mesh. Introduction in MS Excel. Editing, graphics in Excel. Basic operations in Excel. Spreadsheets.)	4
Food Engineering	BA	Food Engineering	I	1	Policies and global strategies for food security (Introducing Food safety, Food Security, Nutrition and Sustainability in the Globalized World. Specific issues of the food sector. Sustainability Challenges and the Politics of Food Supply. Agricultural production as resource for food security. The European Union's agri-food policy. Food security and sustainability versus Nutrition. Programs to assist and support developing countries to eradicate hunger and poverty Bioeconomy - the source and resource for food security and sustainability)	4
Food Engineering	BA	Food Engineering	I	1	Consumer Behavior (Introduction, what is psychology in general, and psychology of eating in a point of view. Short anthropology of feeding. Food needs and their grading. Physiological and psychological needs. Sensitivity and its' importance in food messages. (Visual, tactile, acoustic, olfactory, gustative sensitivity.) Normal states of the cycle hungry – appetite – satiety. Abnormal physiological states of nutrition (eating disorders, obesity, allergies, alcohol consumption etc.). Vegetarianism and veganism. Influence of religion on food consumption. Satisfaction and dissatisfaction created by food. How the food can convince? But the producers? Psychology of eating in the advantage of food producers.)	3
Food Engineering	BA	Food Engineering	I	1	Physical education (1. Presenting a minimal theoretical content, focusing on the physical education activity, carrying out the work safety training, presenting the objectives and requirements of the subject, initial testing. 2. Repeating the main rules from football/volleyball/basketball, separately for boys and for girls, already known from high school; arranging students in attack and defence systems; bilateral games; developing the speed of response to auditory and visual stimuli; educating the dynamic strength at the level of the upper and lower limbs, of the abdomen, of the trunk by means of the circuit and the workshop methods . 3. Mark assessment, by means of specific trials, of the speed-of-movement development level and of the muscle segmentation strength/bilateral strength – of the students' choice . 4. Presenting the subjects approached during the second semester of study; readjusting to the effort; sports games . 5. Consolidating the main elements and technical procedures, specific to sports games; repeating them under pressure, in a bilateral game; developing the elements of coordinative ability – pace, accuracy, static and dynamic balance, spatial and temporal orientation; combining movements; kinaesthetic discrimination; developing ambidextrous abilities; agility; educating aerobic and mixed resistance by means of the uniform and variable efforts. 6. Mark assessment by means of specific trials of the level of resistance and of the degree of mastery of a game.)	1
Food Engineering	BA	Food Engineering	I	2	Special Mathematics (Introduction to the Theory of Probabilities: Terminology and Examples, Basic Notions. Conditional Probability, Independence, Bayes Theorem. Discrete Random Variables, Expected Values, Variance of Discrete Random Variables, Cumulative distribution function. Continuous Random Variables. Families of Continuous Random Variable. Expectation, Variance and Standard Deviation for Continuous Random Variables. Basics of Statistics: Concepts and Terminology; Examples. Samples and Statistics: Sample Mean, Sample Variance, Sample Moments; Quality Criteria for Estimates. Estimation: Point estimation (Methods of Finding	5

					Estimators; Methods of Evaluating Estimators); Interval Estimation (Methods of Finding and Evaluating Interval Estimator), Confidence Intervals. Hypothesis Testing: Methods of Finding and Evaluating Tests)	
Food Engineering	BA	Food Engineering	I	2	Physics (Elements of physical mechanics. Fluids. Oscillations and elastic waves. Elements of molecular physics and thermodynamics. Electromagnetism. Elements of optics. Relativity. Elements of quantum mechanics, atomic and nuclear physics)	6
Food Engineering	BA	Food Engineering	I	2	Organic Chemistry II (Carboxylic compounds. Saturated, aromatic and unsaturated mono-, di- and polycarboxylic acids - carboxyl group structure, production, properties, representatives and uses. Functional derivatives of carboxylic acids. Nomenclature. Classification. Acyl halides, anhydrides, amides and polyamides, esters, orthoesters and polyesters, hydrazides, azides, hydroxamic acids, nitriles and isonitriles - production, properties, representatives. Fats, soaps, heavens - biological importance and in food. Derivatives of carbonic acid. Carbamic acid, urea and derivatives. Halogenoacids - structure, production and properties. Hydroxycarboxylic compounds. Alcoholic acids, phenolic acids - structure, production stereoisomer, important properties and derivatives. Carbonylcarboxylic compounds. A-, β -, γ -Carbonylcarboxylic acids, β -ketone esters. Structure, achievement, properties, in-depth representatives and their uses. Saccharides. Mono- and polysaccharides. Structure, stereoisomerism, mutation, interconversion, properties, related compounds and derivatives. Biological and food importance. Aminoalcohols, aminophenols, aminoaldehydes and aminocetones - structure, production, properties and uses. Amino acids, peptides and proteins. Structure, classification, stereochemistry, production, properties, specific binding, sequential analysis, important derivatives. Biological and food importance. Heterocyclic compounds with mono- and polyheteroatomic 5-membered rings - structure, production, specific properties, important derivatives. Heterocyclic compounds with mono- and polyheteroatomic 6-membered rings - structure, production, specific properties, important derivatives. Dyes. Classification. Main classes of dyes: production and properties. Natural compounds with polyisoprene skeleton: monoterpenoids, diterpenoids, triterpenoids, sesquiterpenoids, carotenoids, steroids - nomenclature, classification, production, properties, more important. Alkaloids - classification, production, properties, representatives and their biological and pharmaceutical importance. Macromolecular compounds. Classification, acquisition, properties. Relationship Structure - Properties. Polymerization of vinyl and diene monomers. Polycondensation.)	5
Food Engineering	BA	Food Engineering	I	2	Technical Drawing and Infographics (Filling in AutoCAD drawings. Shading, dimensioning, annotation in text form. Representation and dimensioning of the assembly drawing. Releasable assembly. 3D drawing in AutoCAD. Solid modeling: basic primitive and non-primitive solids composition. 3D drawing in AutoCAD. Editing solids. Rendering and visualization solids. General rules for achieving the drawings construction, using traditional methods and AutoCAD program. Drawing the construction plan, using the blocks. Schematic drawings. Symbols and marks used in the schematic representations of conventional engineering (technological equipment for the food industry))	5
Food Engineering	BA	Food Engineering	I	2	Foreign language I (English/French - advanced) (1.Diagnostic test. 2.English morphology. General usage and specific aspects of ESP. Articles and nouns. Pronouns and numerals. Adjectives and adverbs. Verbs. Prepositions and conjunctions. 3.English syntax. General usage and specific aspects of ESP. Word order. Sequence of tenses. Direct and reported speech. Active and passive voice. 4. Assessment test)	4
Food Engineering	BA	Food Engineering	I	2	Foreign language II (English/French - beginners) (1. Diagnostic test. French culture and civilisations. 2. Phonetics and orthography. 2. Grammar – lexicology, morphology, syntax. Polysemy, homonymy, antonymy. Elements of lexicology and vocabulary. Word formation. Abbreviation. Specialised terminology. Derivation. Composition. Complex phrases. Collocations. Verbal categories (tense, mood, aspect). Nominal categories (predeterminers, noun, adjective, substitute). 3.Routine and professional communication (oral and written). Language functions. Speech acts – greeting, saying good-bye, introducing oneself and others, talking about oneself, thanking, ordering in a restaurant, expressing certainty/uncertainty, giving advice, asking and	4

					providing directions, apologizing. Assessment test)	
Food Engineering	BA	Food Engineering	II	3	Biochemistry (Chemical composition and organization of living matter: bioelements and biomolecules, description of the typical cell. Carbohydrates: general characteristics, classification; monosaccharides: physico-chemical characteristics, representatives; oligosaccharides and polysaccharides: physico-chemical characteristics, representative. Lipids: general characteristics; fatty acids: nomenclature and classification. Simple lipids: acylglycerols, waxes and sterides. Acylglycerols: general characteristics, physico-chemical properties. Cerides and sterides: general characteristics, representatives. Complex lipids: general characteristics, classes and representatives (phospholipids and glycolipids). Protides: amino acids, peptides and proteins. Amino acids: general characteristics, classification, specific reactions. Peptides: general characteristics, nomenclature, physicochemical properties, representatives (carnosine, anserine, glutathione). Proteins: general characteristics, physicochemical properties, protein classification. Simple proteins and conjugated proteins, representatives). Nucleic acids: general characteristics, components of nucleic acid (nitrogenous bases, nucleosides, nucleotides), the structure and function of nucleic acids. Vitamins: general aspects, classification, fat-soluble vitamins, water-soluble vitamins, vitamin-like compounds. Hormones: general aspects, classification and representatives. Enzymes: general characteristics, structure, enzymatic cofactors, influence of factors on enzymatic activity, enzymatic effectors, regulation of enzymatic activity, classification, representatives of enzyme classes. Metabolism: general aspect, principles of bioenergy, characteristics of intermediate metabolism, biological oxidation (general characteristics, tricarboxylic acid cycle, respiration chain and oxidative phosphorylation); carbohydrate metabolism (photosynthesis, carbohydrate biosynthesis in living organisms, carbohydrate catabolism, glycolysis); lipid metabolism (biosynthesis and degradation of glycerol, fatty acids with a number of carbon atoms, triacylglycerols, protein metabolism (biosynthesis and degradation of amino acids and proteins))	4
Food Engineering	BA	Food Engineering	II	3	General microbiology (Introduction to microbiology: objective of microbiological disciplines and their classification; notions of taxonomy and general systematics of microorganisms; types of cell organization. Infectious entities: Prions and viruses (including phages): structure, reproduction cycles, practical implications. Bacteria: definition, structure, morphological and physiological characters, ways of reproduction, practical implications. Fungi (yeasts and moulds): definition, structure, morphological and physiological characters, ways of reproduction, practical implications. Chemical composition of microorganisms. Nutrition of microorganisms: types of nutrition, nutritional sources, ways of nutrition, culture media. Factors involved in microorganisms' development and physiological activity: intrinsic (pH, aw, Eh), extrinsic (temperature, radiations, chemical substances, gases) and implicit (biological). Obtaining and development control of microorganism cultures: pure cultures, cultivation methods, stages in microorganism development (discontinue asynchronic cultures). Microbial metabolism: definition, metabolic pathways, metabolic types, metabolic processes with practical implications (mechanism, agents – starter cultures, industrial applications))	4
Food Engineering	BA	Food Engineering	II	3	Unitary operations in food industry (Studying methods for unit operations: dimensional analysis, similitude, the balance method. Fluids flow. Operations for separation in liquid heterogeneous systems (sedimentation, filtration). Operations for technological interest (mixing))	6
Food Engineering	BA	Food Engineering	II	3	Elements of mechanical engineering (I. Kinematics and dynamics. 1. Kinematics of a material point. Velocity and acceleration in the Cartesian coordinates. Rectilinear motion. Curvilinear motion. Equation of motion, velocity and acceleration of a material point. 2. Kinematics of Rigid Bodies. General motion of a rigid, velocity, acceleration. Rotational motion. General planar motion. 3. Fundamentals of dynamics. The basic laws of Dynamics. Dynamics of a material point. The mechanical work, kinetic and potential energy, power, efficiency, impulse, kinetic moment. 4. Dynamics of a rigid body. Equation of motion. Basic theorems of dynamics of a rigid body. Impulse theorem. Kinetic energy theorem. Conservation of impulse, of energy, of kinetic moment. II. Structure of the mechanical systems. 1. Structure of the mechanical system. Fundamentals: machine, engine, generator, technological line, mechanism, aggregate, manipulator, robot. Kinetic	5

					<p>elements, kinematic coupling. 2. Classification of kinematic chains, Classification of mechanisms, Degree of Freedom, Degree of mobility Determining mobility. 3. Bar linkage mechanism. Determination of planar mechanism configuration, kinematic analysis of linkage and crank mechanisms.</p> <p>III. Basics of mechanics of materials. 1. Classification of bodies, properties of materials, external and internal loads, stress, strains and deformations, Hooke's law. Tension-compression test. 2. Shear, bending. Drawing the bending moment diagrams. 3. Torsion. Drawing the torsion moment diagrams.</p> <p>IV. Machine elements. 1. Mechanisms with gears. Classification of gear. Geometrical elements of cylindrical spur gears. Kinematic calculation of spur gears. Series of gears. 2. Calculation of spur gear resistance. Load calculation of spur gears, module calculation, geometrical elements of gear. 3. Belt drive. Classification, geometric elements and drive kinematic. 4. Shafts, Classification, Design approach for shafts. Bearings: Classification, Sliding contact bearings, Rolling contact bearings. Bearing calculation.)</p>	
Food Engineering	BA	Food Engineering	II	3	Innocuity of food products (Principles of Toxicology. Anthropogenic contaminants: pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, heavy metals, nitrates, nitrites and n-nitroso compounds, food additives. Natural toxins of plant origin. Bacterial toxins. Mycotoxins. Shellfish toxins. The effect of processing on the nutritional value and toxicity of foods)	5
Food Engineering	BA	Food Engineering	II	3	Principles and methods of food preservation (Part I. Classification of preservation methods. Food preservation by freezing and chilling. Food preservation by smoking. Osmotic dehydration of foods. Food preservation by lactic and alcoholic fermentations. Food preservation by artificial acidification. Food preservation by concentration. Food preservation by classical heat treatment technologies.)	3
Food Engineering	BA	Food Engineering	II	3	Foreign language I (English/French - advanced) (1.Basic terminology in the field of food engineering. Revision of concepts acquired in the previous academic year. 2. Verbal categories (tense, mood, aspect). Text: Macromolecules. 3. Nominal categories (predeterminers, nouns, adjectives, substitutes).Text: Codex Alimentarius. 4. Elements of lexicology and vocabulary. Word formation. Acronyms. Text: Biotechnology. 5. The interrogative sentence; types and characteristics; formation. Text: Food Preservation. 6. Word order. Determiners. Text: Food Manufacturing. 7. The Active Voice vs. The Passive Voice. Uses and characteristics in scientific and technical discourse. Text: Food Engineering. 8. Adjectives and Adverbs. Formation, degrees of comparison, use.Text: Vitamin A. 9. The -ING forms. Text: Chemical Industry. 10. Modals. Uses and characteristics. Text: Food Quality. 11.Sequence of tenses. Text: Food Safety. 12. The Subjunctive. General Revision and Final check-up.)	2
Food Engineering	BA	Food Engineering	II	3	Physical education (1. Presenting a minimal theoretical content, focusing on the physical education activity, carrying out the work safety training, presenting the objectives and requirements of the subject, initial testing. 2. Repeating the main technical and tactical structures from sports games, studied in the first year; arranging students in attack and defence systems; 3X3, 4X4 games played on small fields under moderate or increased difficulty conditions; bilateral games which observe certain rules; developing the speed of response to auditory and visual stimuli; improving the speed running technique; developing the speed of movement by means of accelerating on variable distances of 20 to 60 m.; educating the dynamic strength at the level of the upper and lower limbs, of the abdomen, of the trunk by means of the circuit and the workshop methods, depending on individual potential. 3. Mark assessment, by means of specific trials, of the speed-of-movement development level and of the muscle segmentation strength/bilateral strength – of the students' choice.)	1
Food Engineering	BA	Food Engineering	II	4	Food Chemistry (Water in food. Aggregation, bonding, water activity, ice. Proteins and amino acids in food. Amino acids: structure, classification, chemical reactivity, food content. Protein structure, protein denaturation, hydration, solubility, emulsifying, foaming, gelation, dough formation. Protein quality, digestibility. Chemical alteration of amino acids. Enzymatic modifications of proteins. Food lipids. Fatty acids, acylglycerols: nomenclature, classification.	4

					Lipolysis, oxidation, thermal decomposition, frying, hydrogenation. Waxes. Sterols: phytosterol, cholesterol. Carotenoids, xanthophylls, tocopherols. Carbohydrates in food. Monosaccharides and their importance in food industry. Maillard browning, caramelization. Oligosaccharides and their importance in food industry. Polysaccharides: examples, solubility, viscosity, gelation, hydrolysis. Starch: structure, gelatinization, retrogradation, hydrolysis, swelling, solubilization. Cellulose, gums, xanthan, carrageenans, algin, pectins, dietary fiber: uses in food industry. Enzymatic degradation of carbohydrates and their food applications. Food flavours. Food colorants. Food additives. Food toxic substances.)	
Food Engineering	BA	Food Engineering	II	4	Principles and methods of food preservation (Food preservation by heat application. Food sterilization and pasteurization. Non-thermal processing of foods. High pressure processing of food. Microwave processing of food. Food processing by irradiation. Hurdle technology. Infrared food processing. Ultrasound food processing. Pulsed electric fields processing of food. Intense pulsed light food processing. Food processing by membrane filtration. Recapitulation of the most important concepts)	4
Food Engineering	BA	Food Engineering	II	4	Unitary operations in food industry (Heat transfer. Operations with heat transfer (heating-cooling). Preserving operations (sterilization – pasteurization, concentration – condensation, drying – instantization). Diffusion (mass transfer) and diffusion operations: distillation – rectification)	5
Food Engineering	BA	Food Engineering	II	4	Principles of human nutrition (Current eating problems. The importance of food balance in preserving health. The role of the food industry engineer in ensuring a balanced nutrition of consumers. Energy requirements: influence factors, total energy requirements, energy requirements and rules. Energy value of food. Nutrients and their role in nutrition: proteins, lipids, carbohydrates, vitamins, macro- and micro-elements. The role of water in food. Balance of water. Natural antinutritive substances in foodstuffs. Nutrition physiology. The nutritional characteristics of the food groups. Food pyramid. The influence of technological processes on the nutritional characteristics of foods. Principles of achieving high nutritional food products. Principles of special nutrition: Pregnant women's diet, children, elderly peoples, athletes.)	4
Food Engineering	BA	Food Engineering	II	4	Elements of electrical engineering (Chapter 1 – Physical bases of electric circuit theory (the state of electrification and electric field, electric forces, voltage, current, the state of magnetization and magnetic field, magnetic induction, basic theorems of electric circuits). Chapter 2 – Dipolar circuit elements (passive circuit elements: resistor, inductor, capacitor; active circuit elements: generators; classification of electrical circuits, topology elements for electric circuits. Chapter 3 – Linear DC circuits (cc) - (the laws and theorems of linear DC circuits, transformation of DC linear circuits, methods of analysis of DC electric circuits). Chapter 4 – Linear AC circuits (ca) (single phase circuits, symbolic representations of sinusoidal quantities, circuit elements, electrical power, three-phase circuits, methods of analysis of AC electrical circuits). Chapter 5 – Electrical Measurement (measuring instruments, measurement of current, voltage measurement, power measurement). Chapter 6 – Transformers (single-phase transformers, construction, operation, operating modes, functional characteristics, three-phase transformers). Chapter 7 – Induction machines (three-phase asynchronous motor, construction, operation, functional characteristics, power balance, starting and braking of induction motor). Chapter 8 – DC electric machines (DC motor, construction, operation, functional characteristics, power balance, starting and braking of DC motor))	4
Food Engineering	BA	Food Engineering	II	4	Communication (Personal data communication techniques. Curriculum Vitae (types of CV, rules regarding the accomplishment of a CV). Personal data communication techniques. Cover letter (components, tips regarding the accomplishment of a cover letter). Personal data communication techniques. Interview. The strategy of preparing an interview. Writing communication techniques. Rules regarding the accomplishment of visual resources (tables, graphics, schemes). Writing communication techniques. Rules regarding texts typewriting. Writing communication techniques. How to structure the material for diploma paper and for research paper. Writing communication techniques. Ways of abbreviation and citation styles. Writing communication techniques. Rules	2

					regarding the formulation of titles and abstracts. Oral communication techniques. How to organize an oral presentation. How to prepare an oral presentation. Oral communication techniques. Audio-video equipment used for oral presentations. Oral communication techniques. Rules of accomplishment of a PowerPoint presentation. Oral communication techniques. Rules of accomplishment of a poster)	
Food Engineering	BA	Food Engineering	II	4	Foreign language I (English/French - advanced) (1. Basic terminology in the field of food engineering. Revision of concepts acquired in the previous academic year. 2. Verbal categories (tense, mood, aspect). Text: Acids, Bases and Salts. 3. Nominal categories (predeterminers, nouns, adjectives, substitutes).Text: Oxidation and Reduction. 4. Elements of lexicology and vocabulary. Word formation. Acronyms. Text: Catalysis. 5. The interrogative sentence; types and characteristics; formation. Text: Alcohols. 6. Word order. Determiners. Text: Carboxylic Acids. 7. The Active Voice vs. The Passive Voice. Uses and characteristics in scientific and technical discourse. Text: Salts of Carboxylic Acids. 8. Adjectives and Adverbs. Formation, degrees of comparison, use. Text: Fats (Lipids). 9. The -ING forms. Text: Carbohydrates. 10. Modals. Uses and characteristics. Text: Aminoacids and Proteins. 11.Sequence of tenses. Text: Steroids. 12. Types of subordinate clauses. General Revision and Final check-up)	2
Food Engineering	BA	Food Engineering	II	4	Practical training (<i>Practical work in the dairy pilot plant</i> . Introduction of the hygiene rules and regulations in a dairy pilot plant. Occupational health and safety rules. Introduction of the reception area: Quality control of incoming milk, Elements of the reception unit, Automatization, Parameters for quality control, Calculus. Milk pasteurization area: elements of the pasteurizer, automatization, parameters for quality control, Calculus. Fermentation: Tanks, Pumps, pipes, Automatization, parameters for quality control, Calculus. Packaging: elements of the packaging machine, parameters for quality control. Cheese vat: description, role, unitary operations. Butter churn: the importance of continuous phase. Evaluation. Practical work in the meat pilot plant . Introduction of the hygiene rules and regulations in a meat pilot plant. Occupational health and safety rules. Raw materials, materials and auxiliary materials used in the meat industry. Introduction of the reception area: Quality control of raw materials, materials and auxiliary materials. Classification of carcasses, cutting, boning and selection of meat by quality. The technology of obtaining meat products: fresh products (fresh pork sausages, fresh sheep sausages, minced meat, etc.). The technology of obtaining meat products: (pork parizer, pork frankfurters, etc.). The technology of obtaining meat products: (pork parizer, pork frankfurters, etc.). Evaluation. Practical work in the beer pilot plant . Safety Considerations. Presentation of the brewing pilot plant. Work and hygiene practices. Overall Process Flowsheet. Particularities of the technological processes carried out in the brewing pilot plant. Production of blond, dark, fruit flavored and alcohol-free beer. Analysis of the raw material used in beer brewing. Influence of the technological parameters on quality of the final products. Milling of malt and other raw materials. Mashing. Lautering. Wort boiling and wort conditioning. Equipment descriptions. Utility Requirements. Mass balance and thermal calculation. Fermentation and maturation. Equipment description. Utility Requirements. Mass balance and thermal calculation. Beer clarification and stabilization. Packaging and labelling. Equipment. Evaluation. Evaluation session for knowledge and skills)	4
Food Engineering	BA	Food Engineering	II	4	Physical education (4. Presenting the subjects approached during the second semester of study; readjusting to the effort; sports games. 5. Consolidating the main elements and technical procedures, specific to sports games; repeating them under pressure, in a bilateral game, observing the tasks that must be accomplished on different positions; developing the elements of coordinative ability – pace, accuracy, static and dynamic balance, spatial and temporal orientation; combining movements; kinaesthetic discrimination; developing ambidextrous abilities; agility; educating the mixed and anaerobic lactacid resistance by means of the uniform and variable efforts and by means of interval training. 6. Mark assessment by means of specific trials of the level of resistance and of the degree of mastery of a game.)	1
Food	BA	Food Engineering	III	5	Food biotechnology (Biotechnology basics. Current issues in food biotechnology.	4

Engineering					Biotechnological processes applied in food industry and food waste management. Manufacturing process of microbial enzymes preparations. Enzymes immobilization methods. Classification of enzymes. Enzyme application in food industry. Microorganisms for food production. Lactic acid bacteria as starter cultures. Yeasts as starter cultures. Biotechnology of starch derivatives. Enzymes used for starch hydrolysis. Fermentations to make food ingredients – organic acids, amino acids, vitamins and gums. Biotechnological production of citric acid. Biotechnological applications of acetic acid bacteria. Metabolic engineering for L-Lysine Production. Unconventional protein sources. Enzyme assisted improvement of proteins functionality.)	
Food Engineering	BA	Food Engineering	III	5	Technology and quality control in meat industry (Meat sources: Cattle, Pig, Sheep, Poultry; Others (fish, seafood etc.). From the live animal direct to meat (Slaughtering procedure, mechatronic and robotic systems). Factors that influence meat quality (external and internal of slaughter). Meat quality (sensory, nutritional, technological, and hygienic quality). Meat structure (macrostructure, microstructure, contraction mechanism, muscle proteins, myofibrils and myofibrillar proteins, metabolic enzymes). Postmortem muscle metabolism. The conversion of muscle to meat. Physico-chemical changes during the conversion of muscle to meat. Meat microbiology. Meat processing principles. Meat curing (general preservation principles, salt, water content and water activity, chemistry of nitrate and nitrite: antimicrobial effect, antioxidant effect, colour development, formation of nitrosamines, production of cured meat products without nitrite; ascorbate and erythorbate, phosphates, heat, smoke, storage temperature, chilling and freezing). Meat products. Common meat products. Raw and dried meat products. Cured meat products. Miscellaneous meat products (products from slaughtering by-products, protein isolates). Meat processing techniques (HP pasteurization; Sterilization – pressure-assisted thermal processing, Non-thermal electroprocessing, Thermal electroprocessing, IR preservation, Ultraviolet radiation, High-intensity light pulses, Ultrasound processing, Hydrodynamic shock wave processing). Meat packaging and meat functionality. Assessment techniques for meat quality and safety.)	4
Food Engineering	BA	Food Engineering	III	5	Technology and quality control in dairy industry (Structure, composition and properties of milk as a raw material. Main preservation methods applied in milk and dairy industry. Processed milk. Concentrated and dried dairy products. Fermented milks. Biochemical preservation of milk applied in cheese processing. Butter. Types of butter. Ice cream technology. Types of ice-cream. By-products and secondary products from dairy industry valorisation. Hygiene in dairy units)	4
Food Engineering	BA	Food Engineering	III	5	Specific microbiology (Food microbiology current trends and perspectives. Food microbiota, general considerations. Groups of microorganisms with incidence in the food industry. Microorganisms sources in food microbiota. Beneficial microorganisms in food. Nonstarter microorganisms. Starter cultures: general biotechnological properties: General preparation, preservation and quality control principles. Metabolites produced by microorganisms with technological, preservation and functional implications (bioactive compounds, enzymes, biopreservatives). Contaminating microorganism's particularities, conditions of action, effects. Food spoilage. Conditions, biochemical process and implied biocatalysts (microorganisms and enzymes). Factors which influence the food spoilage and food spoilage prevention. Toxicogenic microorganisms (molds and bacteria). Microorganisms as food poisoning agents. Pathogenic agents with impact of food production and consumption (pathogenic bacteria, phytopathogenic fungi, viruses, prions). Other microorganisms and products of microbial metabolism, which induce biological risk (opportunistic pathogenic bacteria, protozoa, biogenic amines, algae toxins). Modern applied principles in the food microbiological control. Microbiological indicators of microbiological quality of food. Microbiological indicators for food safety. Classical and modern methods used for microbiological quality control of food. Legislative aspects regarding the microbiological quality of food. Defining and applying the microbiological criteria. General principles for the assessment and monitoring of microbiological risks. Applied mathematical modeling to food microbiology. Predictive microbiology.)	4
Food	BA	Food Engineering	III	5	Food quality control in food industry (Current trends in defining food quality and food safety concepts. The main factors that contribute to food quality in design, production and retail. Food	6

Engineering					quality and safety introduced by international standards. Defining: Quality assessment, Durability, Shelf-life, Certification, Labelling, Logo & Trademark signs. Statistical methods for quality control and assessment. ISO 9001- general presentation. Types of food hazards, HACCP: principles, CCP, critical limits, monitoring, corrective actions, validation and improvement. The importance of Prerequisites, PRPop. ISO 22000 and other Food safety management systems)	
Food Engineering	BA	Food Engineering	III	5	Additives and Ingredients in Food Industry (Definition of additives, ingredients and technological auxiliaries. Advantages and risks of using additives. Classification of additives and regulation of their use in European Union. Food colorants: natural and synthetic food colorants. Antiseptic substances (food preservatives) and stabilizer. Antioxidants. Emulsifier substances. Agents with sequestering, stabilizing, buffering and strengthening action and increasing hydration capacity. Acidulants. Hydrocolloids and stabilizing substances. Flavorings and flavor enhancers. Caloric and non-caloric sweeteners. Foaming agents, foam stabilizers and anti-foaming agents. Raising agents. Clarifying and stabilizing substances. Other additives and ingredients used in food industry)	4
Food Engineering	BA	Food Engineering	III	5	Technology and Quality Control in Milling and Bakery Industry (Milling Industry. Grain classification. Grain quality standards. Chemical and biochemical composition of cereals. Preparation of cereals for milling. Technological operations in the cereal milling. The stages of the technological process of milling. Transport in the mills. Storage of products from the mill.)	4
Food Engineering	BA	Food Engineering	III	6	Technology and Quality Control in Milling and Bakery Industry (Bakery Industry. Cap. 1. Technological scheme and food materials quality. Scheme of unit operations. 1.2. Performance indexes of food materials. Cap. 2. Dough preparing. 2.1. Schemes and methods of dough preparation. 2.2. Dough kneading (parameters, processes, equipment). 2.3. Dough fermenting (parameters, processes, equipment). Cap. 3. Dough processing. 3.1. Dividing, moulding, proofing (equipment, processes parameters). Cap. 4. Dough baking. 4.1. Physical, colloidal, biochemical and microbiological processes. 4.2. Heating apparatus. 4.3. Decrease possibilities of heat losses. 4.4. Oven types. Cap.5 Bread cooling and storing (parameters, processes, equipment). Cap.6 Bread types. Cap. 7 Bread defects and illnesses. Cap.8 Bread food value)	4
Food Engineering	BA	Food Engineering	III	6	General Technology in Food Industry – project (Comparative analysis of existing technologies world to achieve the projected production. Defining elements of the products used in the project. Choosing the technology used in project and project implementation description of the technological scheme. Making the general balance of materials based on manufacturing of specific consumption. Designing an industrial technological location using the specific methods learned for each type of food industry. Analysing the economic efficiency of the technological project by financial indicators)	2
Food Engineering	BA	Food Engineering	III	6	Malt and Beer Technology (Definition of beer. History of beer. Beer types and styles. Grains malting. Malt types. Water as raw material. Hops and hop products. Yeast for brewing. Beer production: Milling of malt and other raw material. Mashing. Lautering. Wort boiling. Wort conditioning. Fermentation and maturation. Beer clarification and stabilization. Packaging and labelling.)	4
Food Engineering	BA	Food Engineering	III	6	Special Technology of Processing Groats (Types of snack foods. Cereal grains and other ingredients. Cereal based products. Extrusion. Processes that occur during extrusion. Coating and fortification of extruded snacks. Specific equipment and technological lines used for processing crops)	3
Food Engineering	BA	Food Engineering	III	6	Equipment in food industry (1. Designing Investment Objectives. Stages of documentation. Framework content of the documentation. Pre-feasibility and feasibility studies, technical project and notebooks of tasks. Opinions and agreements. Choice of general location. Establishment of placement in the locality. Designing the enterprise's overall plan: number of equipments, identification and the elaboration of technological diagrams (phases, operations). General criteria for location of equipment. Deposits for raw material and final product. Unit operation chronograms for the equipments. Utilities and diagrams. General construction information: modular co-ordination and design. 2. Metallic materials. Physical, mechanical and technological	3

					properties. Iron-carbon alloys. Fonts and steels (classification and notation). Thermal and thermo-chemical treatments. Copper and its alloys.3. Corrosion. Assessment of aggressiveness of the environment on metal. Chemical and electrochemical corrosion. Factors that influences the corrosion process. Passivity of metals. Protection anticorrosive (preparing the surfaces before being protected anticorrosive. Anticorrosive protection methods). 4. Hygienic engineering and design. Principle and standards. Construction and renovation of food factories. Guideline on hygienic design requirements for processing of food products.)	
Food Engineering	BA	Food Engineering	III	6	Technology and Quality Control in Canning Industry (The importance, specificity and subject matter of the course. Definition and classification of fruits and vegetables. Fruits and vegetables composition. Factors affecting the quality of fruits and vegetables. Quality indexes for fruits and vegetables. Typical processes for fruits and vegetables – respiration and transpiration. Ingathering and transportation – methods and factors affecting these. Sorting, washing, sizing of fruits and vegetables. Canning methods (in salt solution, tomato sauce, in oil, in vinegar, juices and nectars, sugar preservation – classification of methods and technology))	4
Food Engineering	BA	Food Engineering	III	6	Sensorial analysis (The place o sensory analysis in the overall quality of food. The sensations and their role in sensory quality assessment of food. The receptors and the way they perceive the signals. Sensory attributes and the way we perceive them. Sensory adaptation. Sensory thresholds. Factors influencing decisions in sensory analysis. The design of a sensory analysis laboratory. Requirements and rules that must be respected in this. Selection and training panel members. Sensory analysis methodology. Affective tests: Consumer tests and in house acceptance tests. Basic statistical methods.)	3
Food Engineering	BA	Food Engineering	III	6	Special Processing Technologies (Non-thermal minimal processing technologies. Classification. High Pressure Processing (HPP): History. Process description and theoretical aspects. Applications in food industry. Equipment on lab and industrial scale. Consumer acceptance of HPP. Supercritical Fluid Extraction (SFE). History. Properties, advantages and limitations of the SFE. Extraction process description. SFE equipment description. Optimization of SFE. Research SFE equipment and industrial pilot plant. Pulse Light Technology. Basic principle. Mechanism of microbial inactivation. Factor affecting the microbial inactivation by pulsed light. Applications in food industry. Equipments (laboratory and industrial scale). Pulsed Electric Field (PEF) technology. Principle. Laboratory system: components and description of the process. Applications of PEF technology in food industry. Thermal processing technologies. Classification. Microwave technology. History. Principles. Benefits and safety aspects. Description of the equipment. Applications in food industry. Ohmic heating. History. Principle. Equipment description. Applications in food industries)	3
Food Engineering	BA	Food Engineering	III	6	Practical training (Practical work in the dairy pilot plant - Products obtained in the pilot plant. Introduction of the hygiene rules and regulations in a dairy pilot plant. Occupational health and safety rules. Fermented milk products: Technology, parameters, factors that influence fermentation dynamics. Brine cheese making: biochemistry, parameters, quality control. Cream and Butter making. Valorization of buttermilk and whey. How to control the PLC during processing and washing steps. How to control the CCPs in a dairy unit. Evaluation. Practical work in the meat pilot plant - Products obtained in the pilot plant. Introduction of the hygiene rules and regulations in a meat pilot plant. Occupational health and safety rules. The technology of obtaining meat products: sausages and salamis with heterogeneous structure (summer salami, “cabanos” sausages, “Victoria” salami, etc.). The technology of obtaining meat products: sausages and salamis with heterogeneous structure (summer salami, “cabanos” sausages, “Victoria” salami, etc.). The technology of obtaining meat products: specialities (pasteurized, smoked, pasteurized and hot smoked, smoked and dried, etc.). The technology of obtaining semiconservers and canned meat. The technology of obtaining of crude-dry meat products. Evaluation. Practical work in the beer pilot plant. Safety Considerations. Presentation of the brewing pilot plant. Work and hygiene practices. Overall Process Flowsheet. Particularities of the technological	4

					processes carried out in the brewing pilot plant. Production of blond, dark, fruit flavored and alcohol-free beer. Analysis of the raw material used in beer brewing. Influence of the technological parameters on quality of the final products. Milling of malt and other raw materials. Mashing. Lautering. Wort boiling and wort conditioning. Equipment descriptions. Utility Requirements. Mass balance and thermal calculation. Fermentation and maturation. Equipment description. Utility Requirements. Mass balance and thermal calculation. Beer clarification and stabilization. Packaging and labelling. Equipment. Evaluation)	
Food Engineering	BA	Food Engineering	IV	7	General Technology - Technology and control in wine industry (Introduction. Ampelography. Physico mechanical analysis and uvological indexes of grapes. Suphitation of grapes and wines. Preparing the winemaking campaign. Harvesting, transporting and reception of the grapes. The technology of grape must obtaining. Conditioning of the must. Maceration fermentation technology of mash and must. Chemical composition, physical-chemical and sensory indexes of wines. Evolution and aging of wines. The white, red and rosé winemaking technology. Wines bottling. Vinegar making technology. Distilled alcoholic beverages preparation technology)	4
Food Engineering	BA	Food Engineering	IV	7	Equipment in food industry (1. Equipments for the transport of fluid food products. Pumps: classification, specifications and parameters, types, constructive description, applications, exemples. 2. Equipments for the transport of solid food products. Carriers and elevators : classification, constructive description, applications, exemples. 3. Equipments for preparation the raw materials for technological process (washing, peeling, separators, cutting, pressing, concentration, smashing, impurities eliminations, thermal treatment, drying, etc). Constructive description, examples and applications. 4. Industrial or pilot plant for milk and milk products, fruit or vegetable juices, chips and snacks, etc (examples, constructive description))	4
Food Engineering	BA	Food Engineering	IV	7	General Technology - Technology and quality control in the sugary and flour products industry (Cap.1 Technology of floury products. 1.1. Technology of floury paste. 1.2. Technology of biscuits. 1.3. Technology of Neapolitan wafers. Cap. 2 Technology of sugary products. 2.1. Technology of candies products. 2.2. Technology of caramel products. 2.3. Technology of dragees products. 2.4. Technology of gelatinized products. 2.5. Technology of fondant products. 2.6. Technology of chocolate and cocoa products. 2.7. Technology of halva products)	4
Food Engineering	BA	Food Engineering	IV	7	General Technology - Technology and control the oil industry (Oilseeds and ancillary materials used in edible vegetable oils industry. Primary conditioning of oilseeds. Conditioning of vegetable oil feedstocks to produce crude oils. Obtaining crude vegetable oil by pressing Purification of crude press edible vegetable oil. Obtaining crude vegetable oil by extraction Recovery of the extraction solvent. Conditioning of rough crops. Refining of crude vegetable oils. Technologies modern refining of edible oils. Storage of edible vegetable oils. Packaging of edible vegetable oils Margarine technology)	4
Food Engineering	BA	Food Engineering	IV	7	General Technology - Technology and control in sugar industry (Raw materials for the sugar industry. Sugar diffusion installations. Juice purification and crystallization. Sugar conditioning)	4
Food Engineering	BA	Food Engineering	IV	7	Marketing (1. Introductory course. Subject's objectives and acquired competencies as a result of learning, working methods and tools, as well as the requirements and formative assessment standards during the study and final evaluation. Presenting the topics, each student shall write an essay, about a financial product project with a marketing vision, study that will be held in the seminar. 2. Acquiring marketing concept by critical analysis of various points of view presented in reference works, chronologically, by a comparative analysis of different schools and thinking. 3. Complex analysis of marketing concept describing: the consumer location in relation to the seller of goods or services, marketing activities and functions based on the consumer's characteristics; organization's characteristics that endorses the concept of marketing and marketing functions. 4. Marketing's scope and specialization. 5. Marketing environment. 6. Market organization: concepts, features, dimensions, target market. 7. Competition: concepts, competitive environment, competition types, identifying competitors and their typology. 8. Market conditions: terms, concepts, description elements. 9. Marketing strategies and marketing mix: definitions, terms,	5

					typologies, content. 10. Product policy: objectives, concepts, strategies, relations with other marketing mixvariables. 11. Pricing: marketing approaches in pricing policy, in micro and macro economy, marketing, strategies in targeting and setting prices, marketing activities in the pricing policy of the organization, the relationship between pricing and other. variables of the marketing mix, within the marketing policy of the organization. 12. Distribution policy: definitions, functions, activities, marketing channels, logistic system, distribution strategies, operational distribution strategies and relations between distribution policy and other variables of the marketing mix. 13. Promotional policy: concepts, systems analysis of organizational communication, objectives, activities, promotional strategy, operational promotion policy and its relationship with other variables of the marketing mix in its marketing policy. 14. Organizing the marketing's activity: organization's marketing culture, identifying marketing activities in different types of organizations, designing various forms of marketing organization, marketing systems generated by the marketing organization, marketing organization coverage of new trends in marketing thinking.)	
Food Engineering	BA	Food Engineering	IV	7	Novel food design (The new food product concept. The life cycle of a product. Strategy of new food products developing. Developing of the Research and Development Department Stages of new food products development. Identify of need consumer, ideas generating, ideas evaluation, food concept developing, product and process developing, marketing / launching. Consumer preferences. Factors that influence of purchasing decision. Intellectual and industrial property. Patent institutions in Europe. Elements of psychology in the creative process. Innovation management. The promotion mix. Launching strategies)	3
Food Engineering	BA	Food Engineering	IV	7	Technological project (Comparative analysis of existing technologies world to achieve the projected production. Defining elements of the products used in the project. Choosing the technology used in project and project implementation description of the technological scheme. Making the general balance of materials based on manufacturing of specific consumption. Designing an industrial technological location using the specific methods learned for each type of food industry. Analysing the economic efficiency of the technological project by financial indicators)	2
Food Engineering	BA	Food Engineering	IV	8	Hygiene (The relationship between hygiene and food safety – Legislative aspects (Food Law, New Hygiene Package, ISO 22000/2005). Designing and establishment of buildings considering hygiene as priority. Equipment design considering hygiene as priority. Concepts promoted by EHEDG. Hygiene of surfaces (How dirt deposits are formed and methods to remove them. Biofilm formation. Disinfectants and disinfection technique. Methods for verification of hygiene on surfaces.) Air hygiene (Air contaminants, decontamination techniques, methods to verify air hygiene). Programmes for maintenance and hygiene for premises and equipments. Microorganisms representing food hazards. Pest and pest control. Waste management. Personal Hygiene. Hygienic food handling. Hygiene for transportation vehicles and food stores. Trainings dedicated to hygiene for food business operators. Hygiene verification during official controls performed in food processing units.)	4
Food Engineering	BA	Food Engineering	IV	8	Packaging and design in food industry (1. Introduction in packaging techniques. 2. Packaging and label functions. 3. Factors influencing production and use of packaging. 4. Packaging materials preparation for use. 5. Food product dosage. 6. Packaging of liquid and semi- solid food products. 7. Food product packaging in flexible packages. 8. Food product packaging in cardboard packages. 9. Food product packaging in thermoformed packages. 10. Food packaging closing. 11. Packaging labelling and printing. 12. Secondary and tertiary packaging. Smart and intelligent packaging)	4
Food Engineering	BA	Food Engineering	IV	8	Fraudes and identification of food products (Milk and dairy products adulteration and assessing methods. Meat and meat products adulteration and assessing methods. Honey bee adulteration and assessing methods. Wine adulteration and assessing methods. Oils and fats adulteration and assessing methods)	4
Food	BA	Food Engineering	IV	8	Management (1. Introduction to Management. 2. Communication in Management. 3. Marketing Management Orientation. 4. Strategic Management and Strategy. 5. The Decision-Making Process	4

Engineering					in an Organization. 6. Organizational structure. 7. Human resource management. 8. Resource Management. 9. Stress and Time Management. 10. Management methods and techniques. 11. Management of SME's. 12. Organizational culture and ethical behavior)	
Food Engineering	BA	Food Engineering	IV	8	Ecology and Environment Protection (1.History of ecology. Ecological systems theory. Characteristics of living systems: diversity, complexity, stability. 2. Population as a level of organization. 3. Biotope and biocenosis. 4. Functional features of the ecosystem. 5. Ecological succession. 6. Ecosfera. Energy flow in the ecosystem. 7. Economic development and the environment. 8. Ways of damage to nature. 9. Pollution. 10. Overexploitation of the resources. 11. Fragmentation of the natural ecosystems. 12. Introduction of new species. 13. Genetic pollution. 14. Nature conservation and ecological reconstruction)	3
Food Engineering	BA	Food Engineering	IV	8	Equipment in food industry - project (Solid / fluid food product processing line: elaboration of the technological diagrams, identification of measuring, control and automation elements, insertion into the technological diagrams, equipments, elaboration of the equipment chronographs, elaboration of utility consumption chronographs (steam, water, cold, and electricity), and design of the general plan for the processing unit)	4
Food Engineering	BA	Food Engineering	IV	8	Economic calculation in the graduation projects (Building and equipments costs. Raw material and ingredients costs. Utility costs. Human resources costs. Production cost. Total cost.)	2
Food Engineering	BA	Food Engineering	IV	8	Legislation and consumer protection (General notions of normative legal acts. Concept of legal normative act. The constituent parts of the normative legal act. Structure elements of legal normative act. Legal liability. The technique of drafting the legal norms. Consumer protection, food safety and security worldwide. Consumer protection - the main objective of the United Nations. The role of the World Health Organization (WHO) in ensuring food and nutritional security. The role of the United Nations Food and Agriculture Organization (FAO). The Codex Alimentarius Commission - a joint body of the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) in Nutrition and Food Policy. Codex Alimentarius. Commission and Consumer Protection. Consumer protection, food safety and security at EU level. General aspects of the European Union. The institutional framework of the European consumer policy. The European dimension of consumer policy. Protecting the food consumer in the European Union. The White Book on Food Safety. European Food Safety Authority (EFSA) - European Food Safety Authority at European level. Consumer Protection and Food Safety in Romania. Consumer protection - a component of social protection policy. Definition of consumer rights. Consumer protection in Romania. Institutional framework for consumer protection in Romania. National bodies responsible for food safety. Control - the basic component of the activity carried out by the Regional / County Commissariats for Consumer Protection within the National Authority for Consumer Protection. Consumer information in the market by labeling. New EU regulations on food hygiene and nutrition and health information transposed into national legislation. The hygiene package - The provisions of Regulation 853/2004 of 29 April 2004 on food hygiene; The provisions of Regulation no. 853/2004 on specific hygiene rules for animal origin food. EC Regulation No 1924/2006 of the European Parliament and of the Council on the 20th of December 2006 on nutrition and health information made on foods.)	4
Food Engineering	BA	Food Engineering	IV	8	Practice to Graduation Project Elaboration (The opportunity and justification of the chosen theme. Documentary study. The final choice of technological manufacturing schemes with detailed parameters. Technological calculation. Equipment calculation. Quality and hygiene management in the projected section. Economic calculation. Graphical part (minimum sketch of the projected section and sketch of its overall location; additional scores are provided for all utility charts, diagram flow, equipment chronogram and representations))	1
Food Engineering	BA	Control and expertise of foods	III	5	Specific microbiology (Food microbiology current trends and perspectives. Food microbiota, general considerations. Groups of microorganisms with incidence in the food industry. Microorganisms sources in food microbiota. Beneficial microorganisms in food. Nonstarter	4

					microorganisms. Starter cultures: general biotechnological properties: General preparation, preservation and quality control principles. Metabolites produced by microorganisms with technological, preservation and functional implications (bioactive compounds, enzymes, biopreservatives). Contaminating microorganism's particularities, conditions of action, effects. Food spoilage. Conditions, biochemical process and implied biocatalysts (microorganisms and enzymes). Factors which influence the food spoilage and food spoilage prevention. Toxicogenic microorganisms (molds and bacteria). Microorganisms as food poisoning agents. Pathogenic agents with impact of food production and consumption (pathogenic bacteria, phytopathogenic fungi, viruses, prions). Other microorganisms and products of microbial metabolism, which induce biological risk (opportunistic pathogenic bacteria, protozoa, biogenic amines, algae toxins). Modern applied principles in the food microbiological control. Microbiological indicators of microbiological quality of food. Microbiological indicators for food safety. Classical and modern methods used for microbiological quality control of food. Legislative aspects regarding the microbiological quality of food. Defining and applying the microbiological criteria. General principles for the assessment and monitoring of microbiological risks. Applied mathematical modeling to food microbiology. Predictive microbiology.)	
Food Engineering	BA	Control and expertise of foods	III	5	Enzymatic and immunological methods of analysis (Enzymes: definition, sources, units, activity, extraction methods. Use of enzymes for analytical determination. Use of ATP Bioluminescence for Rapid Detection and Contaminants identification. PCR versus RT-PCR methods and their use in food industry. Antigens and antibodies. Labelling substances used in immunological reactions. Immunological reactions classification. Serological techniques used for pathogens identification RIA, IRMA and ELISA methods and their use in the food industry. Immunomagnetic separation (IMS) method. Analytical methods validation .)	5
Food Engineering	BA	Control and expertise of foods	III	5	Food analysis with electromagnetic radiation (The methodology of food analysis and control. Electromagnetic radiation. Spectral domains. Interaction between food and electromagnetic radiation. Food analysis using nuclear magnetic resonance (NMR). Food analysis using microwave spectrometry. Food analysis using vibrational spectroscopy (IR, NIR, Raman). Food analysis using UV-Vis spectrometry. Food analysis using atomic spectrometry. Food analysis using X-ray spectrometry)	5
Food Engineering	BA	Control and expertise of foods	III	5	Quality management (Concepts related to food quality and safety. Food quality characteristics. Factors affecting food quality. Classes of quality. Quality defects. Standardization: objectives, advantages, standards, bodies, standardization of quality characteristics. Attestation, guarantee and certification of food products compliance. Branding and coding of products. Classification of brands. Brand types. Organic labelling of products. Bar coding. Calimetry: principles, methods, indicators. Economic aspects of quality: optimal quality, optimizing quality costs. Quality management systems. Total Quality Management. Principles.)	6
Food Engineering	BA	Control and expertise of foods	III	5	Additives and Ingredients in Food Industry (Definition of additives, ingredients and technological auxiliaries. Advantages and risks of using additives. Classification of additives and regulation of their use in European Union. Food colorants: natural and synthetic food colorants. Antiseptic substances (food preservatives) and stabilizer. Antioxidants. Emulsifier substances. Agents with sequestering, stabilizing, buffering and strengthening action and increasing hydration capacity. Acidulants. Hydrocolloids and stabilizing substances. Flavorings and flavor enhancers. Caloric and non-caloric sweeteners. Foaming agents, foam stabilizers and anti-foaming agents. Raising agents. Clarifying and stabilizing substances. Other additives and ingredients used in food industry)	3
Food Engineering	BA	Control and expertise of foods	III	5	General technology in food industry (The importance, specificity and subject matter of the course. Putting the good use of vegetables and fresh fruits. Conditioning and keeping eggs. Slaughtering technology. Acid dairy products technology. Butter technology. Cheese technology. White and red wine technology. Malt and brewery technology. Spirit technology. Tobacco products technology)	4

Food Engineering	BA	Control and expertise of foods	III	5	Food biotechnology (Biotechnology basics. Current issues in food biotechnology. Biotechnological processes applied in food industry and food waste management. Manufacturing process of microbial enzymes preparations. Enzymes immobilization methods. Classification of enzymes. Enzyme application in food industry. Microorganisms for food production. Lactic acid bacteria as starter cultures. Yeasts as starter cultures. Biotechnology of starch derivatives. Enzymes used for starch hydrolysis. Fermentations to make food ingredients – organic acids, amino acids, vitamins and gums. Biotechnological production of citric acid. Biotechnological applications of acetic acid bacteria. Metabolic engineering for L-Lysine Production. Unconventional protein sources. Enzyme assisted improvement of proteins functionality.)	3
Food Engineering	BA	Control and expertise of foods	III	6	Chromatographic and electrophoretic methods of analysis of food (Chromatographic methods – general information (the chromatograph components, classification, chromatographic separation mechanisms). High Performance Liquid Chromatography (HPLC): pump, injector, mobile phase, stationary phase, detectors). HPLC versus FPLC (Fast Protein Liquid Chromatography). Gas chromatography: components, mobile phase, detectors, columns, characteristics. Chromatogram: elements and fundamental units. Specific units and equations for a chromatographic column. Proteins gel electrophoresis (SDS-PAGE). Capillary electrophoresis: principle, components, types, characteristics.)	4
Food Engineering	BA	Control and expertise of foods	III	6	Minimum athermal and thermal processing of food products (I. Introduction. Concept of minimal processing of foods by thermal and non-thermal methods. 1. Concept of minimal processing of food by thermal and non-thermal methods – Classification and general presentation of minimal processing techniques. II. Minimal processing of foods by non-thermal methods. 1.High pressure processing (HPP) – Theoretical aspects, mechanisms and applications. Effect of HPP on foods, food nutrients and sensorial characteristics. Processing equipment. 2.Pulsed light - Theoretical aspects, mechanisms and applications. Influence on foods and food nutrients. Processing equipment. 3.Pulsed electric field (PEF) - Theoretical aspects, mechanisms and applications. Influence on foods, food nutrients and sensorial characteristics Processing equipment. 4.Irradiation - Theoretical aspects, mechanisms and applications. Influence on foods, food nutrients and sensorial characteristics. Processing equipment. 5.Ultrasounds - Theoretical aspects, mechanisms and applications. Influence on foods, food nutrients and sensorial characteristics Processing equipment. 6.Cold plasma - Theoretical aspects, mechanisms and applications. Influence on foods, food nutrients and sensorial characteristics. Processing equipment. 7.Supercritical fluid extraction - Theoretical aspects, mechanisms and applications. Influence on food nutrients. Processing equipment. III.Minimal processing of foods by thermal methods - 1.Infrared heating - Theoretical aspects, mechanisms and applications. Influence on foods, food nutrients and sensorial characteristics. Processing equipment. 2.Microwave heating - Theoretical aspects, mechanisms and applications. Influence on foods, on food nutrients and sensorial characteristics. Processing equipment. 3.Ohmic heating - Theoretical aspects, mechanisms and applications. Influence on foods, on food nutrients and sensorial characteristics. Processing equipment. IV.Packaging methods applied to minimally processed foods. 1.Packaging in controlled and modified atmosphere of minimally processed foods. 2.Active packaging and intelligent packaging of minimally processed foods)	5
Food Engineering	BA	Control and expertise of foods	III	6	Quality management (Fundamental Aspects related to Food Safety. Legislative regulations. Food safety management systems. HACCP system – overview. The main categories of hazards. Classification. Examples. Sources of contamination. Diseases of food origin. Preliminary steps for implementing HACCP. HACCP Principles. Food safety system documentation. Procedures. Handbook on Quality and Safety of Food. Organizational measures for HACCP implementation. Organization, implementation and management of the HACCP system. General overview of ISO 22000:2005 standard. Some concepts related to traceability.)	5
Food Engineering	BA	Control and expertise of foods	III	6	Equipment in food industry (Equipment in food industry (1. Designing Investment Objectives. Stages of documentation. Framework content of the documentation. Pre-feasibility and feasibility studies, technical project and notebooks of tasks. Opinions and agreements. Choice of general	3

					location. Establishment of placement in the locality. Designing the enterprise's overall plan: number of equipments, identification and the elaboration of technological diagrams (phases, operations). General criteria for location of equipment. Deposits for raw material and final product. Unit operation chronograms for the equipments. Utilities and diagrams. General construction information: modular co-ordination and design. 2. Metallic materials. Physical, mechanical and technological properties. Iron-carbon alloys. Cast irons and steels (classification and notation). Thermal and thermo-chemical treatments. Copper and its alloys. 3. Corrosion. Assessment of aggressiveness of the environment on metal. Chemical and electrochemical corrosion. Factors that influences the corrosion process. Passivity of metals. Protection anticorrosive (preparing the surfaces before being protected anticorrosive. Anticorrosive protection methods). 4. Hygienic engineering and design. Principle and standards. Construction and renovation of food factories. Guideline on hygienic design requirements for processing of food products.)	
Food Engineering	BA	Control and expertise of foods	III	6	Sensorial analysis (The place o sensory quality assessment of food. The receptors and the way they perceive the signals. Sensory attributes and the way we perceive them. Sensory adaptation. Sensory thresholds. Factors influencing decisions in sensory analysis. The design of a sensory analysis laboratory. Requirements and rules that must be respected in this. Selection and training panel members. Sensory analysis methodology. Affective tests: Consumer tests and in house acceptance tests. Basic statistical methods.)	3
Food Engineering	BA	Control and expertise of foods	III	6	General technology in food industry (Raw materials used in extractive food industry. Milling technology. Bakery technology. Farinaceous products technology. Sugar technology. Sugar confectionery technology. Edible vegetable oils technology)	4
Food Engineering	BA	Control and expertise of foods	III	6	General Technology in Food Industry – project (Comparative analysis of existing technologies world to achieve the projected production. Defining elements of the products used in the project. Choosing the technology used in project and project implementation description of the technological scheme. Making the general balance of materials based on manufacturing of specific consumption. Designing an industrial technological location using the specific methods learned for each type of food industry. Analysing the economic efficiency of the technological project by financial indicators)	2
Food Engineering	BA	Control and expertise of foods	III	6	Practical training (Practical work in the dairy pilot plant - Products obtained in the pilot plant. Introduction of the hygiene rules and regulations in a dairy pilot plant. Occupational health and safety rules. Fermented milk products: Technology, parameters, factors that influence fermentation dynamics. Brine cheese making: biochemistry, parameters, quality control. Cream and Butter making. Valorization of buttermilk and whey. How to control the PLC during processing and washing steps. How to control the CCPs in a dairy unit. Evaluation. Practical work in the meat pilot plant - Products obtained in the pilot plant. Introduction of the hygiene rules and regulations in a meat pilot plant. Occupational health and safety rules. The technology of obtaining meat products: sausages and salamis with heterogeneous structure (summer salami, “cabanos” sausages, “Victoria” salami, etc.). The technology of obtaining meat products: sausages and salamis with heterogeneous structure (summer salami, “cabanos” sausages, “Victoria” salami, etc.). The technology of obtaining meat products: specialities (pasteurized, smoked, pasteurized and hot smoked, smoked and dried, etc.). The technology of obtaining semiconservers and canned meat. The technology of obtaining of crude-dry meat products. Evaluation. Practical work in the beer pilot plant. Safety Considerations. Presentation of the brewing pilot plant. Work and hygiene practices. Overall Process Flowsheet. Particularities of the technological processes carried out in the brewing pilot plant. Production of blond, dark, fruit flavored and alcohol-free beer. Analysis of the raw material used in beer brewing. Influence of the technological parameters on quality of the final products. Milling of malt and other raw materials. Mashing. Lautering. Wort boiling and wort conditioning. Equipment descriptions. Utility Requirements. Mass balance and thermal calculation. Fermentation and maturation. Equipment description.	4

					Utility Requirements. Mass balance and thermal calculation. Beer clarification and stabilization. Packaging and labelling. Equipment. Evaluation)	
Food Engineering	BA	Control and expertise of foods	IV	7	Equipment in food industry (1. Equipments for the transport of fluid food products. Pumps: classification, specifications and parameters, types, constructive description, applications, exemples. 2. Equipments for the transport of solid food products. Carriers and elevators : classification, constructive description, applications, exemples. 3. Equipments for preparation the raw materials for technological process (washing, peeling, separators, cutting, pressing, concentration, smashing, impurities eliminations, thermal treatment, drying, etc). Constructive description, examples and applications. 4. Industrial or pilot plant for milk and milk products, fruit or vegetable juices, chips and snacks, etc (examples, constructive description))	4
Food Engineering	BA	Control and expertise of foods	IV	7	Fraudes control in food industry (Milk and dairy products adulteration and assessing methods. Meat and meat products adulteration and assessing methods. Fish and fish products adulteration and assessing methods. Honey bee adulteration and assessing methods)	4
Food Engineering	BA	Control and expertise of foods	IV	7	Statistical Control of Foods (History of statistics; Concepts and development. Statistical methods applied in food industry; Understanding data; Data observation; Data gathering; Principles; Indicators calculation; Probability distributions functions (Gauss-Laplace, Poisson, Bernoulli, Fisher, Student). Errors in Statistical Control and Uncertainty estimation. The need for sampling; Sampling methods, types of sampling. Statistical hypothesis; Confidence intervals. Process. Statistical Control. Variance ANOVA. Introduction in regression analysis and correlation)	4
Food Engineering	BA	Control and expertise of foods	IV	7	Sanitary-veterinary control and foods safety (Sanitary veterinary control of food products of animal origin. Sanitary veterinary control of pork and poultry meat. Biochemical changes in meat after slaughtering and their practical importance. Degradation and alteration of food products. Sanitary veterinary control of eggs and egg products. Sanitary veterinary control of raw milk and products. dairy products. Sanitary veterinary inspection of fish and fish products. Sanitary veterinary control of honey)	5
Food Engineering	BA	Control and expertise of foods	IV	7	Phytosanitary control (1. Phytosanitary control - object and scope. Responsible authorities, legislation, official documents. 2. Phytosanitary quarantine measures, methods and means. 3. Phytosanitary control of agricultural crops. 4. Phytosanitary control of stored plant products. 5. Agrofitotechnical measures for plant protection. 6. Physical and mechanical measures for plant protection. 7. Biological measures for plant protection. 8. Chemical measures for plant protection. 9. Plant pathogens properties: affinity, pathogenicity, virulence, aggressiveness. 10. Successive phases of infectious plant diseases. 11. Forecast and warning in integrated control. 12. Security measures applied in plant protection work)	2
Food Engineering	BA	Control and expertise of foods	IV	7	Technological project (Comparative analysis of existing technologies world to achieve the projected production. Defining elements of the products used in the project. Choosing the technology used in project and project implementation description of the technological scheme. Making the general balance of materials based on manufacturing of specific consumption. Designing an industrial technological location using the specific methods learned for each type of food industry. Analysing the economic efficiency of the technological project by financial indicators)	2
Food Engineering	BA	Control and expertise of foods	IV	7	Marketing (1. Introductory course. Subject's objectives and acquired competencies as a result of learning, working methods and tools, as well as the requirements and formative assessment standards during the study and final evaluation. Presenting the topics, each student shall write an essay, about a financial product project with a marketing vision, study that will be held in the seminar. 2. Acquiring marketing concept by critical analysis of various points of view presented in reference works, chronologically, by a comparative analysis of different schools and thinking. 3. Complex analysis of marketing concept describing: the consumer location in relation to the seller of goods or services, marketing activities and functions based on the consumer's characteristics; organization's characteristics that endorses the concept of marketing and marketing functions. 4. Marketing's scope and specialization. 5. Marketing environment. 6. Market organization: concepts, features, dimensions, target market. 7. Competition: concepts, competitive environment,	5

					competition types, identifying competitors and their typology. 8. Market conditions: terms, concepts, description elements. 9. Marketing strategies and marketing mix: definitions, terms, typologies, content. 10. Product policy: objectives, concepts, strategies, relations with other marketing mixvariables. 11. Pricing: marketing approaches in pricing policy, in micro and macro economy, marketing, strategies in targeting and setting prices, marketing activities in the pricing policy of the organization, the relationship between pricing and other. variables of the marketing mix, within the marketing policy of the organization. 12. Distribution policy: definitions, functions, activities, marketing channels, logistic system, distribution strategies, operational distribution strategies and relations between distribution policy and other variables of the marketing mix. 13. Promotional policy: concepts, systems analysis of organizational communication, objectives, activities, promotional strategy, operational promotion policy and its relationship with other variables of the marketing mix in its marketing policy. 14. Organizing the marketing's activity: organization's marketing culture, identifying marketing activities in different types of organizations, designing various forms of marketing organization, marketing systems generated by the marketing organization, marketing organization coverage of new trends in marketing thinking.)	
Food Engineering	BA	Control and expertise of foods	IV	8	Hygiene (The relationship between hygiene and food safety – Legislative aspects (Food Law, New Hygiene Package, ISO 22000/2005). Designing and establishment of buildings considering hygiene as priority. Equipment design considering hygiene as priority. Concepts promoted by EHEDG. Hygiene of surfaces (How dirt deposits are formed and methods to remove them. Biofilm formation. Disinfectants and disinfection technique. Methods for verification of hygiene on surfaces.) Air hygiene (Air contaminants, decontamination techniques, methods to verify air hygiene). Programmes for maintenance and hygiene for premises and equipments. Microorganisms representing food hazards. Pest and pest control. Waste management. Personal Hygiene. Hygienic food handling. Hygiene for transportation vehicles and food stores. Trainings dedicated to hygiene for food business operators. Hygiene verification during official controls performed in food processing units.)	4
Food Engineering	BA	Control and expertise of foods	IV	8	Packaging and design in food industry (1. Introduction in packaging techniques. 2. Packaging and label functions. 3. Factors influencing production and use of packaging. 4. Packaging materials preparation for use. 5. Food product dosage. 6. Packaging of liquid and semi- solid food products. 7. Food product packaging in flexible packages. 8. Food product packaging in cardboard packages. 9. Food product packaging in thermoformed packages. 10. Food packaging closing. 11. Packaging labelling and printing. 12. Secondary and tertiary packaging. Smart and intelligent packaging)	4
Food Engineering	BA	Control and expertise of foods	IV	8	Fraudes control in food industry (Wine, beer and spirits adulteration and assessing methods. Cereals and cereal products adulteration and assessing methods. Fruit and vegetables products adulteration and assessing methods. Oils and fats adulteration and assessing methods. Coffee, cocoa and chocolate adulteration and assessing methods. Tea and spices adulteration and assessing methods)	4
Food Engineering	BA	Control and expertise of foods	IV	8	Management (1. Introduction to Management. 2. Communication in Management. 3. Marketing Management Orientation. 4. Strategic Management and Strategy. 5. The Decision-Making Process in an Organization. 6. Organizational structure. 7. Human resource management. 8. Resource Management. 9. Stress and Time Management. 10. Management methods and techniques. 11. Management of SME's. 12. Organizational culture and ethical behavior)	4
Food Engineering	BA	Control and expertise of foods	IV	8	Ecology and Environment Protection (1. History of ecology. Ecological systems theory. Characteristics of living systems: diversity, complexity, stability. 2. Population as a level of organization. 3. Biotope and biocenosis. 4. Functional features of the ecosystem. 5. Ecological succession. 6. Ecosfera. Energy flow in the ecosystem. 7. Economic development and the environment. 8. Ways of damage to nature. 9. Pollution. 10. Overexploitation of the resources. 11. Fragmentation of the natural ecosystems. 12. Introduction of new species. 13. Genetic pollution. 14. Nature conservation and ecological reconstruction)	3

Food Engineering	BA	Control and expertise of foods	IV	8	Design of quality control systems (Selecting of the technological scheme that will be the subject of the food safety plan. Advanced documentation on the selected product. Development of the preliminary programs in terms of GHP, GMP, etc. Development of the HACCP plans. Development of general procedures, in terms of preventive and corrective actions, audit, control of documents and records, control of nonconforming product. Periodic evaluation)	4
Food Engineering	BA	Control and expertise of foods	IV	8	Legislation and consumer protection (General notions of normative legal acts. Concept of legal normative act. The constituent parts of the normative legal act. Structure elements of legal normative act. Legal liability. The technique of drafting the legal norms. Consumer protection, food safety and security worldwide. Consumer protection - the main objective of the United Nations. The role of the World Health Organization (WHO) in ensuring food and nutritional security. The role of the United Nations Food and Agriculture Organization (FAO). The Codex Alimentarius Commission - a joint body of the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) in Nutrition and Food Policy. Codex Alimentarius. Commission and Consumer Protection. Consumer protection, food safety and security at EU level. General aspects of the European Union. The institutional framework of the European consumer policy. The European dimension of consumer policy. Protecting the food consumer in the European Union. The White Book on Food Safety. European Food Safety Authority (EFSA) - European Food Safety Authority at European level. Consumer Protection and Food Safety in Romania. Consumer protection - a component of social protection policy. Definition of consumer rights. Consumer protection in Romania. Institutional framework for consumer protection in Romania. National bodies responsible for food safety. Control - the basic component of the activity carried out by the Regional / County Commissariats for Consumer Protection within the National Authority for Consumer Protection. Consumer information in the market by labeling. New EU regulations on food hygiene and nutrition and health information transposed into national legislation. The hygiene package - The provisions of Regulation 852/2004 of 29 April 2004 on food hygiene; The provisions of Regulation no. 853/2004 on specific hygiene rules for animal origin food. EC Regulation No 1924/2006 of the European Parliament and of the Council on the 20th of December 2006 on nutrition and health information made on foods.)	4
Food Engineering	BA	Control and expertise of foods	IV	8	Economic calculation in the graduation projects (Building and equipments costs. Raw material and ingredients costs. Utility costs. Human resources costs. Production cost. Total cost.)	2
Food Engineering	BA	Control and expertise of foods	IV	8	Practice to Graduation Project Elaboration (Performing studies, laboratory analyzes, pilot experiments, design according to the specificity of the project topic. Designing a quality and safety management system for an existing unit. Designing a manufacturing line and food-safety system. Achieving technological computing elements)	1