BACHELOR OF ENGINEERING IN AGRI-FOOD ENGINEERING

Main Language of Instruction:
French ☑ English ○ Arabic ○

Campus Where the Program Is Offered: Taanayel (entire program, 5 years), CST (5 semesters)

OBJECTIVES

The Bachelor of Engineering in Agri-Food Engineering enables students to:

- Conduct research and develop products for the food processing industries.
- Manage production lines in food processing industries while optimizing production.
- Implement quality systems in food processing industries to ensure production complies with international standards for quality and consumer health.
- Pursue higher education at internationally renowned universities.

PROGRAM LEARNING OUTCOMES (COMPETENCIES)

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

PROGRAM REQUIREMENTS

300 credits: Required courses (268 credits), Institution's elective courses (24 credits), Open elective courses (8 credits), and USJ General Education Program (34 credits, may be part of the above categories).
Preparatory in Food Industry Engineering program
120 credits: Required courses (110 credits), Institution's elective courses (6 credits), Open elective courses (4 credits)

Fundamental Courses (116 Cr.)

Required Courses (110 Cr.)
Mathematics for Engineers (4 Cr.); Calculus for Engineers I (2 Cr.); General Chemistry (4 Cr.); Digital Environment (4 Cr.); Expression Techniques in AI era (4 Cr.); Thermodynamics (2 Cr.); Geography (2 Cr.); Introduction to Engineering (2 Cr.); Topography and Land Planning (2 Cr.); USJ Values in Daily Life (2 Cr.); Algebra for Engineers (4 Cr.); General Biology (4 Cr.); Solution Chemistry (4 Cr.); Volunteer and Citizen Action (2 Cr.); Basic Ecology (2 Cr.); Electricity and Mechanics (2 Cr.); Geology (2 Cr.); Introduction to Agriculture and Agri-Food I (2 Cr.); Lebanese Labor Law (2 Cr.); Environmental Sciences (2 Cr.); Accounting and Management Tools (2 Cr.); Calculus for Engineers II (4 Cr.); Structural Biochemistry (4 Cr.); Organic Chemistry (4 Cr.); General Genetics (2 Cr.); Fluid Mechanics (2 Cr.); Probability and Statistics (4 Cr.); Mass Transfer (2 Cr.); Introduction to Agriculture and Agri-Food II (2 Cr.); Career Coaching and Personal Branding (2 Cr.); Metabolic Biochemistry (2 Cr.); Analytical Chemistry (4 Cr.); General Economics (2 Cr.); General Microbiology (4 Cr.); Human Nutrition (4 Cr.); Heat Transfer (2 Cr.); Arabic Language and Media (2 Cr.); Food Technologies (4 Cr.); Introduction to Python (2 Cr.); Engineering Properties of Biological Materials (2 Cr.).

Institution's Elective Courses (6 Cr.), to be chosen from the list below:
Wine Tasting (2 Cr.); Olive Oil Tasting (2 Cr.); Environmental Chemistry (2 Cr.); Talent Management and Strategic Leadership (2 Cr.); Forest Management (2 Cr.); Public and Institutional Governance (2 Cr.); Epidemiology and Public Health (2 Cr.); Development of Individuals and Organizational Behavior (2 Cr.).
Open Elective Courses (4 Cr.)

Bachelor of Engineering in Agri-Food Engineering
180 credits: Required courses (158 credits), Institution's elective courses (18 credits), Open elective courses (4 credits)

Fundamental Courses (176 Cr.)
Required Courses (158 Cr.)
Market Economics (2 Cr.); Advanced Python (2 Cr.); Ethics in Agri-Food Industries (2 Cr.); Toxicology I (2 Cr.); Fundamentals of Food Industrial Engineering (2 Cr.); Introduction to Marketing (2 Cr.); Unit Operations I (4 Cr.); Applied Computer Tools (2 Cr.); Applied Statistics (2 Cr.); Internship 2 (2 Cr.); Food Biotechnology (2 Cr.); Drinking Water Treatment: From Source to Consumer (2 Cr.); Food Biochemistry (4 Cr.); English 4 (4 Cr.); Food Biochemical Analysis (2 Cr.); AI Ethics in Agriculture and Agri-Food (2 Cr.); Food Microbiology (2 Cr.); Toxicology II (2 Cr.); Operational Research (2 Cr.); Fluids and Energy (2 Cr.); Experimental Design I (2 Cr.); Agricultural and Food Policies (2 Cr.); Industrial Fermentation (4 Cr.); Formulation and Ingredients (2 Cr.); Unit Operations II (4 Cr.); Food Hygiene, Quality and Safety (2 Cr.); Production Management (2 Cr.); Technology of Meat, Fishery Products, and Related Industries (2 Cr.); Beverage and Juice Industry (2 Cr.); Milling and Bakery (2 Cr.); Sensory Analysis (2 Cr.); Internship 3 (2 Cr.); Edible Oil Technology (2 Cr.); Food Risk Control and Verification (2 Cr.); Agri-Food Industry Equipment (4 Cr.); Food Packaging (4 Cr.); Quality and Production Management Tools (2 Cr.); Innovation and Entrepreneurship in Food Industries (4 Cr.); Dairy Technology (4 Cr.); Fruit and Vegetable Industry (2 Cr.); Additives and Flavors (2 Cr.); Experimental Design II (2 Cr.); Quality, Health, Safety and Environment Management (4 Cr.); Applied Business Management and Organization (2 Cr.); Statistical Process Control (2 Cr.); Supply Chain and Logistics Management (4 Cr.); Science, Engineering and Environmental Sustainability (4 Cr.); Global Marketing and Digital Communication (2 Cr.); Managerial Finance for Agribusiness (4 Cr.); Corporate Social Responsibility and Business Ethics (2 Cr.); Conflict Management, Stress Management (2 Cr.); Final Year Project (30 Cr.) .

Institution's Elective Courses (18 Cr.), to be chosen from the list below:
Beekeeping and Honey (4 Cr.); Nutrition and Communities (2 Cr.); AutoCAD and Photoshop (2 Cr.); Spirits Industry (2 Cr.); Oenology (2 Cr.); Rheology and Food Texture (2 Cr.); Brewing (2 Cr.); Advanced Processing Technologies (2 Cr.); Risk and Crisis Management (2 Cr.); International Trade of Food Products (2 Cr); GIS: Diagnostic and Forecasting Tool (2 Cr.); Project Management Methodology (2 Cr.); Seminar (2 Cr.); Natural Resource Remediation and Rehabilitation (2 Cr.).

Open Elective Courses (4 Cr.)

USJ General Education Program (34 Cr.)

Code	Course Name	Credits
	ENGLISH OR OTHER LANGUAGE	**4**
028ANG4S2	English 4	4
	ARABIC	**4**
	Arabic Language and Culture	**2**
435LALML2	Arabic Language and Media	2
	Other Course Taught in Arabic	**2**
028INAGI2	Introduction to Agriculture and Agri-Food I	2
	HUMANITIES	**8**
064VALEL1	USJ Values in Daily Life	2
	Ethics	**2**

076CRBES5	Corporate Social Responsibility and Business Ethics	2
	Civic Engagement and Citizenship	**2**
028VCACS3	Volunteer and Citizen Action	2
	Other Humanities Course	**2**
076GCGSS5	Conflict Management, Stress Management	2
	SOCIAL SCIENCES	**6**
	Professional Integration and/or Entrepreneurship	**4**
028CCPBI3	Career Coaching and Personal Branding	4
	Other Social Sciences Course	**2**
076DIAGS4	Innovation and Entrepreneurship in Food Industries	2
	QUANTITATIVE TECHNIQUES	**8**
028PRSTI3	Probability and Statistics	4
028ENNUI1	Digital Environment	4
	COMMUNICATION TECHNIQUES	**4**
028TEXPI1	Expression Techniques in Digital Era	4

SUGGESTED STUDY PLAN

Semester 1

Code	Course Name	Credits
	Required Courses - Preparatory in Agri-Food Engineering	
028ANA1I1	Calculus for Engineers I	2
028MATHI1	Mathematics for Engineers	4
028CHIGI1	General Chemistry	4
028ENNUI1	Digital Environment	4
028TEXPI1	Expression Techniques in AI Era	4
028GÉOGI2	Geography	2
028PHY1I1	Thermodynamics	2
064VALEL1	USJ Values in Daily Life	2
028INENI1	Introduction to Engineering	2
028TOATI1	Topography and Land Planning	2
	Open Elective Course	2
	Total	**30**

Semester 2

Code	Course Name	Credits
	Required Courses - Preparatory in Agri-Food Engineering	
028ALGEI2	Algebra for Engineers	4
028CHISI2	Solution Chemistry	4
028BIGEI2	General Biology	4
028VCACS3	Volunteer and Citizen Action	2
028ECOLI1	Fundamental Ecology	2

028PHY2I2	Electricity and Mechanics	2
028GÉOLI2	Geology	2
028INAGI2	Introduction to Agriculture and Agri-Food I	2
028DRTLI2	Lebanese Labor Law	2
028SCENI2	Environmental Sciences	2
028COMPI2	Accounting and Management Tools	2
	Institution's Elective Course	2
	Total	**30**

Semester 3

Code	Course Name	Credits
	Required Courses - Preparatory in Agri-Food Engineering	
028ANA2I3	Calculus for Engineers II	4
028BCHSI3	Structural Biochemistry	4
028CHIOI3	Organic Chemistry	4
028GENEI3	General Genetics	2
028PHY3I3	Fluid Mechanics	2
028PRSTI3	Probability and Statistics	4
028TRMAI3	Mass Transfer	2
028IAIII3	Introduction to Agriculture and Agri-Food II	2
028CCPBI3	Career Coaching and Personal Branding	2
	Institution's Elective Course	2
	Open Elective Course	2
	Total	**30**

Semester 4

Code	Course Name	Credits
	Required Courses - Preparatory in Agri-Food Engineering	
028BCHMI4	Metabolic Biochemistry	2
028CHIAI4	Analytical Chemistry	4
028ECOGI4	General Economics	2
028MICRI4	General Microbiology	4
028NUTRI4	Human Nutrition	4
028PHY4I4	Heat Transfer	2
435LALML2	Arabic Language and Media	2
028TECAI4	Food Technologies	4
028INPYI4	Introduction to Python	2
028EPBMI4	Engineering Properties of Biological Materials	2
	Institution's Elective Course	2
	Total	**30**

Semester 5

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agri-Food Engineering	
076ECOAS1	Market Economics	2
076ADPYS1	Advanced Python	2
076DEONS1	Ethics in Agri-Food Industries	2
076TOX1S1	Toxicology I	2
076BGIAS3	Fundamentals of Food Industrial Engineering	2
076INM1S1	Introduction to Marketing	2
076OPU1S1	Unit Operations I	4
076OIAPS1	Applied Computer Tools	2
076STAPS1	Applied Statistics	2
076STG2S1	Internship 2	2
076BTALS1	Food Biotechnology	2
076TRECS1	Drinking Water Treatment: From Source to Consumer	2
	Institution's Elective Course	2
	Open Elective Course	2
	Total	**30**

Semester 6

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agri-Food Engineering	
076BCHAS2	Food Biochemistry	4
028ANG4S2	English 4	4
076ABALS2	Food Biochemical Analysis	2
028AIAAS2	AI Ethics in Agriculture and Agri-Food	2
076MCRAS2	Food Microbiology	2
076TOX2S2	Toxicology II	2
028REOPS2	Operational Research	2
076FLENS2	Fluids and Energy	2
076PEPMS2	Experimental Design I	2
028POAGS2	Agricultural and Food Policies	2
	Institution's Elective Course	6
	Total	**30**

Semester 7

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agri-Food Engineering	
076FERIS3	Industrial Fermentation	4
076FRINS3	Formulation and Ingredients	2
076OPU2S3	Unit Operations II	2
076HQSAS3	Food Hygiene, Quality and Safety	4

076GEPRS2	Production Management	2
076INCHS3	Technology of Meat, Fishery Products, and Related Industries	2
076INBJS3	Beverage and Juice Industry	2
076MEUPS3	Milling and Bakery	2
076ANSES4	Sensory Analysis	2
076STG3S3	Internship 3	2
076TEHAS3	Edible Oil Technology	2
	Institution's Elective Course	2
	Open Elective Course	2
	Total	**30**

Semester 8

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agri-Food Engineering	
076CVRAS4	Food Risk Control and Verification	2
076EQIAS4	Food Industries Equipment	4
076EMBAS3	Food Packaging	4
076OMQPS4	Quality and Production Management Tools	2
076DIAGS4	Innovation and Entrepreneurship in Food Industries	4
076TLAIS4	Dairy Technology	4
076INFLS4	Fruit and Vegetable Industry	2
076INGAS3	Additives and Flavors	2
076PLEXS4	Experimental Design II	2
	Institution's Elective Course	4
	Total	**30**

Semester 9

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agri-Food Engineering	
076MQSES5	Quality, Health, Safety, and Environment Management	4
076BMORS5	Applied Business Management and Organization	2
076MSPRS5	Statistical Process Control	2
076MSCAS5	Supply Chain and Logistics Management	4
076SGDES5	Science, Engineering and Environmental Sustainability	2
076GMDCS5	Global Marketing and Digital Communication	2
076MFABS5	Managerial Finance for Agribusiness	4
076CRBES5	Corporate Social Responsibility and Business Ethics	2
076GCGSS5	Conflict Management, Stress Management	2
	Institution's Elective Course	4
	Total	**30**

Semester 10

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agri-Food Engineering	
028MDFES6	Final Year Project	30
	Total	**30**

COURSE DESCRIPTION

076INGAS3 Additives and Flavors 2 Cr.

This course explores the role, types, and effects of food additives and flavorings. Students will learn about preservatives, colorants, emulsifiers, natural and artificial flavors, regulations, health implications, and consumer expectations. Practical examples prepare them to design compliant and appealing food products.

076ADPYS1 Advanced Python 2 Cr.

This course enhances students' programming skills by covering advanced Python concepts: lambda functions, decorators, generators, file handling, error management, and libraries such as NumPy and pandas. Students will learn to analyze experimental data, automate tasks, and develop digital tools for the agri-food sector.

028ALGEI2 Algebra for Engineers 4 Cr.

This course aims to provide students with essential knowledge in algebra, matrix calculus, solving linear systems, and reducing endomorphisms. It equips them with manipulation techniques necessary for subjects such as computing, hydraulics, heat transfer, statistics, and data analysis. Topics include: vector spaces, linear applications, algebraic structures, matrices, matrix calculus, determinants, and linear systems.

028ANA1I1 Calculus for Engineers I 2 Cr.

This course introduces fundamental concepts of analysis. Designed for first-year students, it remains elementary with carefully proven results, encouraging rigorous reasoning. Topics include: functions of a real variable, differentiability, and standard functions.

028ANA2I3 Calculus for Engineers II 4 Cr.

This course introduces theoretical and practical concepts related to differential equations and integration. Students will study double and triple integrals, line integrals, Green-Riemann theorem, Laplace transformations, and their applications. Topics include: Laplace transforms, Taylor expansions, integral calculus, numerical sequences, multiple integrals, and differential equations.

076ANSES4 Sensory Analysis 2 Cr.

This course focuses on sensory evaluation used in the food industry to improve the organoleptic qualities of products. Students will explore the diversity of taste preferences and food habits. Topics include: sensory perception (flavors and aromas), sensory tests, reference mapping, panel management, and statistical analysis of results.

076ABALS2 Food Biochemical Analysis 2 Cr.

This course enables students to analyze key food components (proteins, lipids, carbohydrates, vitamins, minerals, and additives). Practical sessions allow them to apply modern biochemical techniques for nutritional quality assessment, fraud detection, regulatory compliance, and process improvement.

028ANG4S2 English 4 4 Cr.

This course focuses on acquiring terminology specific to agriculture and agribusiness (soil, plant and animal production, food processing, regulation). It also strengthen students' oral and written communication skills, develop their critical thinking in English, and prepare them for professional integration. Topics include: sustainable

076BTALS1 Food Biotechnology 2 Cr.

This course explores the use of microorganisms, enzymes, and biological processes in food transformation and preservation. Students will discover the principles of fermentation, the production of fermented products (yogurts, cheeses, beverages), as well as the application of biotechnologies in improving the nutritional and organoleptic qualities of food. The course also addresses recent innovations such as GMOs and industrial enzymes, while integrating regulatory, ethical, and food safety aspects.

076BRASS4 Brewing 2 Cr.

This course aims to provide students in the food industry with a complete mastery of the beer manufacturing process (from raw materials to conditioning/packaging), by analyzing the biochemical and microbiological transformations and applying the principles of Process Engineering and Quality Control specific to this fermentation sector.

028CCPBI3 Career Coaching and Personal Branding 2 Cr.

This course helps students align their aspirations with the practical realities of the workplace and the business environment. It guides them in positioning themselves within an industry sector, a professional branch, and a specific occupation. The objective is to support the development of a professional project that will inform the search for internships, future training, and employment opportunities.

028CHIAI4 Analytical Chemistry 4 Cr.

This course enables students to: define the necessary steps for preparing a sample for analysis; understand and master the main techniques for extracting organic molecules; understand and master the main techniques for extracting minerals; understand and master the primary spectroscopic techniques; understand and master the main chromatographic techniques; critically read a scientific article; analyze different types of chromatograms. Topics include: Sampling. Extraction techniques for organic compounds. Extraction techniques for minerals. Chromatography. Gas chromatography (GC). Liquid chromatography (HPLC). Atomic absorption. ICP-MS. Assays.

028CHISI2 Solution Chemistry 4 Cr.

This course enables students to: define the different types of chemical reactions; recognize the basic concepts related to chemical kinetics; recognize the basic concepts related to chemical equilibrium; solve equilibrium problems; characterize and differentiate acids and bases; recognize the applications of equilibrium in aqueous media; understand the basics of electrochemistry and use the concept of electrode potential in various applications.

028CHENI2 Environmental Chemistry 2 Cr.

This course aims to provide students in agronomy and agro-food with the necessary tools to understand the chemical and anthropogenic issues related to the environment. It teaches them to characterize, at the molecular level, the processes governing the functioning and evolution of natural ecosystems: atmosphere, water, and soil. This course presents a general overview of the major environmental compartments, and secondly, it details the chemistry and physico-chemistry of molecules within these different compartments. It should be noted that understanding the functioning of natural ecosystems is essential for developing new environmentally respectful production techniques, implementing effective natural resource management policies, and developing solutions to contamination and pollution problems of anthropogenic origin.

028CHIGI1 General Chemistry 4 Cr.

This course provides students with basic notions in chemistry to build a solid foundation for the teaching of organic and analytical chemistry, which are indispensable for the later understanding of food chemistry and biochemistry.
Topics include: Atom. Periodic classification of elements. LEWIS model of molecules and ions. Association of atoms: molecules and ions. Resonance. Molecular polarity. States of matter.

028CHIOI3 Organic Chemistry 4 Cr.

This course introduces the fundamental notions of structure, nomenclature, stereochemistry, and reaction mechanisms, and provides the necessary terminology corresponding to these various concepts. It aims to integrate

these notions into the explanation of organic reaction mechanisms as well as the study of various addition and substitution reactions.
Topics include: Introduction to organic chemistry. Stereochemistry. Conformations. Physical organic chemistry. Reactions in organic chemistry. Reactivity of simple organic functions (alkanes, alkenes, alkynes, organomagnesium compounds, halogenated derivatives, and alcohols), using the main types of reaction mechanisms. Nomenclature. Organic chemistry lab.

076CIPAS4 International Trade of Food Products 2 Cr.

This course examines the mechanisms, regulations, and challenges of importing and exporting food products worldwide. Students will learn international trade rules, sanitary and phytosanitary standards, and logistics and marketing strategies specific to the agro-food sector.
The course prepares students to address issues of quality, traceability, trade barriers, and certifications to support the development of international food trade.

028COMPI2 Accounting and Management Tools 2 Cr.

This course introduces accounting organization through a good understanding and sufficient assimilation of the basic principles of general accounting.

076CVRAS4 Food Risk Control and Verification 2 Cr.

This course enables students to ensure the sanitary safety of food. It emphasizes the implementation of the HACCP method, the management of product traceability along the agri-food chain, and internal and external audit techniques. Through case studies and simulations, students will develop the skills to identify, assess, and control biological, chemical, and physical hazards in compliance with international standards.

076CRBES5 Corporate Social Responsibility and Business Ethics 2 Cr.

This course explores the principles and practices of corporate social responsibility and business ethics in the agro-food sector. It addresses environmental, social, and economic issues in food production, processing, and distribution. Students will learn to integrate sustainable, transparent, and ethical practices into agro-food business management, taking into account consumer expectations, regulations, and societal impacts.

028DEHOI2 Olive Oil Tasting 2 Cr.

This course introduces students to the sensory evaluation of extra virgin olive oil. They will learn to recognize different qualities, aromas, and flavors, and to detect possible defects. The course also highlights factors influencing taste, such as olive variety, terroir, and extraction methods. It prepares future professionals to ensure quality and enhance the value of this key Mediterranean food product.

028DEGUI1 Wine Tasting 2 Cr.

This course introduces students to the organoleptic analysis of wines. It covers evaluation techniques for aroma, flavor, color, and texture, along with an understanding of the various stages of wine production. Students will learn to identify wine characteristics based on origin, grape variety, and production methods, while developing awareness of quality standards and factors influencing taste. This foundational course is essential for food industry professionals aiming to promote wine products.

076DEONS1 Ethics in Agri-Food Industries 2 Cr.

This course offers a definition of ethics and "food law," encompassing all regulations directly or indirectly related to food, thereby broadening the scope of food ethics.
Topics include: the evolution of the food industry over time, animal-based foods, novel foods, "functional" foods, street foods, and "organic" foods. Harmful substances in human and animal food: food additives, pesticide and veterinary drug residues, and contaminants. Regulations governing the preparation, processing, and sale of food.

028DEVCI2 Development of Individuals and Organizational Behavior 2 Cr.

This course aims to develop students' personal traits and managerial skills. It explores the role and importance of individuals within an organization. Topics include human behavior, motivation (self and others), empowerment and delegation, teamwork and conflict management, organizational behavior, leadership, supervision, and management.

028DRTLI2 Lebanese Labor Law 2 Cr.

This course provides essential legislative knowledge in labor law to ensure students meet the minimum required legal understanding as future employees or supervisors.

028ECOLI1 Fundamental Ecology 2 Cr.

This course aims to introduce the fundamental aspects of ecology as an environmental science. After acquiring core concepts, students will explore endangered species conservation and human-induced environmental degradation.
Topics include: the concept of ecological niches, biotic and abiotic factors, interactions within biocenoses, energy flow and matter cycling, and ecosystem regulation factors. Also covered are the general organization of the biosphere, structure of biocenoses and ecosystems, ecological factors, population ecology, and ecological monitoring.

076ECOAS1 Market Economics 2 Cr.

This course familiarizes students with the food system and its stakeholders, introduces the basic concepts of the value chain approach complemented by industrial and competitive analysis, and explores the dynamics of food product consumption and markets.
Topics include: definition of agri-food economics, history of food acquisition and types of food societies, analysis of Lebanese agri-food value chains, systemic approach and identification of food system sub-systems, theoretical frameworks applied to food systems, agri-food chains, industrial and competitive analysis in the agri-food sector, food product markets (consumption, demand, international trade), and the roles of key actors (distribution, agri-food industries, agriculture, input suppliers).

028ECOGI4 General Economics 2 Cr.

This course aims to equip students with the necessary concepts to understand the economic context of business management issues. Topics include: basic definitions, labor force, economic circuits and main national accounting aggregates, consumption, public spending, major types of economic systems, and investment.

028PHY2I2 Electricity and Mechanics 2 Cr.

This course covers fundamental concepts in mechanics and electricity.
In mechanics, it addresses velocity, acceleration, and force in rigid systems; energy and work, including conservation and dissipation; the momentum theorem; and the study of damped and undamped harmonic oscillators. Topics also include kinematics and dynamics of a particle, force work, momentum, and angular momentum.
In electricity, the course examines direct and alternating current circuits with resistors, capacitors, inductors, and combinations (R, C), (R, L), (L, C), and (R, L, C). It explores electric network principles and laws, active and passive components, Kirchhoff's laws, and the behavior of q(t), i(t), and u(t) in dynamic systems. Additional topics include electrostatics, Laplace and Lorentz forces, Ohm's law, sinusoidal alternating current, Fresnel diagrams, diodes, and filters.

076EMBAS3 Food Packaging 4 Cr.

This course explains the role of packaging in the preservation of agri-food products through the study of material-product interactions.
Topics include: economic and industrial overview of the packaging sector, packaging production, container-content interactions, packaging analysis, packaging technologies, and environmental considerations.

028EPBMI4 Engineering Properties of Biological Materials 2 Cr.

This course explores the physical properties of agricultural and biological products (density, texture, thermal conductivity, porosity, elasticity, etc.). Students will learn how to measure and analyze these properties to design, optimize, and control processing, handling, and storage methods. This module plays a crucial role in developing technologies tailored to the characteristics of agri-food products.

028ENNUI1 Digital Environment 4 Cr.

This course enables students to understand computer hardware operation, master the use of operating systems and office software, and develop skills in oral presentation and communication tools. Students will also learn to use major Internet services and create static websites.

076SAPUI4 Epidemiology and Public Health 2 Cr.

This course offers students the opportunity to understand the field of nutritional public health. It addresses various public health issues where diet plays a significant role, as well as the primary prevention of these problems through nutrition.
Topics covered include: Introduction to epidemiological methods, Preventive nutrition and public health, Prevention and specific dietary factors, Genetically modified organisms, New diet-related diseases, Obesity prevention strategies, Global food insecurity.

076EQIAS4 Food Industries Equipment 4 Cr.

This course teaches how to select, operate, and maintain equipment suited to various food industry processes to achieve optimized production performance.
Topics include: equipment distribution across production zones, packaging and filling equipment, waste treatment systems (solid, liquid, gas), cleaning and disinfection equipment (including CIP systems), equipment efficiency concepts, and Overall Equipment Effectiveness (OEE).

076FERIS3 Industrial Fermentation 4 Cr.

This course enables future agri-food engineers to recognize the various types of fermentation used in the food industry, understand their main characteristics, and explore their diverse applications, particularly in baking, brewing, winemaking, and dairy processing.
Topics include: introduction, cellular metabolism and regulation, fermentation processes, fermentation and biotechnology, fermentation as a biological reaction, technical implementation and modeling of fermentation, and brewing.

076FLENS2 Fluids and Energy 2 Cr.

This course provides students with the physical principles governing energy production and absorption by fluids used in the food industry. It also familiarizes them with their applications across unit operations and production sectors.
Topics include: energy costs and sustainable management, energy challenges in the agri-food industry, fluid mechanics fundamentals, heat exchangers, and energy utilities in food production—operation, energy diagnostics (consumption analysis), and optimization.

076FRINS3 Formulation and Ingredients 2 Cr.

This course provides students with a deep understanding of the principles of food product formulation and the role of the different raw materials they comprise. It covers the classification and functional properties of ingredients such as texturing agents, preservatives, additives, colorants, flavorings, and nutrients, emphasizing their impact on the sensory, nutritional, and technological quality of products. The curriculum also includes the study of ingredient interactions, formulation methods adapted to various product types, and aspects related to safety, regulation, and sustainability in raw material selection. By the end of this course, students will be able to design and evaluate innovative and balanced food formulations that meet requirements for performance, preservation, quality, and compliance with current standards.

028GENEI3 General Genetics 2 Cr.

This course covers the basics of gene structure and expression regulation, mechanisms of hereditary transmission, and sources of genetic variability.
Topics include: introduction to genetics, cytogenetics, mitosis and the cell cycle, meiosis and its genetic implications, extensions of Mendelian genetics, genes and traits with DNA as the genetic information carrier, transcription and gene expression regulation, bacterial genetics, and genetic information modification.

028GÉOGI2 Geography 2 Cr.

This course explores climatic elements affecting the distribution and types of crops, erosion processes leading to the formation of arable soils, and correlations between crop yields and climate variations. Students will also learn to interpret landforms and slope structures using topographic maps.
Topics include: definitions, evolution, and goals of geography, climate and agriculture, geomorphology (external dynamics of continents), and topography.

028GÉOLI2 Geology 2 Cr.

This course introduces students to the Earth's physical properties and dynamic mechanisms, mineral matter (minerals and rocks), major geological phenomena, related landscapes, and the impact of surface and groundwater circulation.
Topics include: geothermal energy, magnetism, density, Earth's structure, seismic waves, Earth's age, volcanoes, earthquakes, crustal deformation, crystalline and amorphous minerals, igneous, sedimentary, and metamorphic rocks, paleontology (geological eras and fossils), landscape evolution (faults, folds, thrusts, and nappes), structural analysis (microtectonics, structural styles, orogenic theories), stratigraphy, and paleogeography.

076GCGSS5 Conflict Management, Stress Management 2 Cr.

This course aims to develop students' skills in understanding, preventing, and resolving workplace conflicts, as well as managing stress effectively. It covers sources and types of conflicts, assertive communication techniques, negotiation, and mediation. The course also explores stress mechanisms, its impacts on health and performance, and individual and organizational strategies to reduce it. Through practical exercises and case studies, students will acquire tools to foster a harmonious work environment and improve their personal and professional well-being.

076GEPRS2 Production Management 2 Cr.

This course teaches students how to manage industrial enterprises more effectively by applying concepts and theories to improve productivity, quality, reduce costs, and shorten lead times.
Topics include: inventory and procurement management, OPT method, MRP and ERP systems, JIT, material handling, TPM, 5S, SMED, quality control, statistical process control (SPC), sampling, industrial flow management, industrial diagnostics, and lean management approaches.

028FOREI4 Forest Management 2 Cr.

This course covers the principles and techniques for the sustainable management of forests and natural areas. Students will study planning, biodiversity conservation, fire prevention, and forestry practices adapted to environmental and economic challenges. Emphasis is placed on the integration of forests within agricultural landscapes and their essential role in climate regulation and resource preservation.

028GERCS4 Risk and Crisis Management 2 Cr.

This course aims to provide the essential methods and tools required to identify, analyze, evaluate, and prevent potential risks (technical, financial, environmental, reputational) within an organization. It also details crisis management strategies, including the setup of a dedicated crisis unit, the development of Business Continuity Plans (BCPs), and crisis communication techniques. The overall goal is to train professionals capable of ensuring organizational resilience in the face of threats and minimizing the impact of unforeseen events.

076GMDCS5 Global Marketing and Digital Communication 2 Cr.

This course explores international marketing strategies with a strong emphasis on digital communication tools and techniques. Students will learn to analyze global markets, design marketing campaigns tailored to different cultures and consumer behaviors, and use digital platforms (social media, SEO, online advertising) to promote products, especially in the agri-food sector.

028GOPI4 Public and Institutional Governance 2 Cr.

This course introduces students to the structures and mechanisms of local and international public institutions, as well as the principles of democratic governance. It helps them understand public policies, decision-making processes, and challenges related to resource management, transparency, and accountability. Special focus is given to the agriculture, environment, and food sectors, exploring their institutional frameworks and governance issues.

076HQSAS3 Food Hygiene, Quality and Safety 2 Cr.

This course covers the essential principles and practices required to ensure food safety. Students will study hygiene standards, quality control systems, methods to prevent microbiological and chemical contamination, and current food safety regulations. The course emphasizes implementing quality approaches such as HACCP to safeguard consumers throughout the agri-food supply chain.

028AIAAS2 AI Ethics in Agriculture and Agri-food 2 Cr.

This course explores the ethical implications of using AI in agriculture and the food sector. It addresses data privacy, algorithm transparency, bias in decision systems, and the social/environmental impact of smart technologies. Through case studies and debates, students will develop ethical reasoning for responsible AI integration.

076INBJS3 Beverage and Juice Industry 2 Cr.

This course explores the processes for producing, preserving, and ensuring quality control of non-alcoholic beverages, especially fruit juices. Students will examine raw materials, extraction techniques, pasteurization, bottling, hygiene standards, and regulatory frameworks. Focus is placed on innovation, food safety, and emerging consumption trends.

076INFLS4 Fruit and Vegetable Industry 2 Cr.

This course covers harvesting, sorting, storage, processing, and packaging of fruits and vegetables. It emphasizes maintaining nutritional and sensory quality and managing post-harvest losses. Students will also learn about food safety standards and innovations that enhance value in the agri-food chain.

076INCHS3 Technology of Meat, Fishery Products, and Related Industries 2 Cr.

This course introduces the slaughtering and processing stages of meat production, explains the meat supply chain, identifies the physiological components of meat and their impact on final product quality, and examines the factors influencing organoleptic quality. It also explores technologies applied in meat processing.
Topics include: animal transport and slaughter, meat composition and aging, meat quality, cooking, freezing, chilling, equipment used in meat product processing, manufacturing principles of processed meats, selection of meat and non-meat ingredients, processed and fresh products, cooked and raw-cooked products, dried meat, packaging, meat product risks, safe meat handling at home, recent scientific discoveries, and hands-on lab sessions.

076INSPS2 Spirits Industry 2 Cr.

This course offers an in-depth study of the production processes of various spirits—from agriculture to packaging—specific to whiskey, vodka, gin, rum, brandies (e.g., cognac), arak and tequila/mezcal. It includes legal and regulatory aspects of controlled designations in the sector.
Students will explore global supply chains, market trends, major international players, and categories of alcoholic beverages.

028INAGI2 Introduction to Agriculture and Agri-Food I 2 Cr.

This course introduces the characteristics of the agricultural world by exploring various sectors within agronomy, understanding farm operations through surveys, discovering agricultural and agri-food businesses through organized visits, and practicing agriculture and food production.

028IAIII3 Introduction to Agriculture and Agri-Food II 2 Cr.

This course introduces students to basic agricultural techniques on a farm. In plant production, they will learn and practice planting, sowing, weeding, pesticide application, fertilization, driving a tractor, and hitching a plow. In animal production, students will learn to clean a barn and mechanically milk a cow. The course also provides an introduction to hygiene rules in a dairy and an overview of the stages involved in producing fresh cheese.

076DIAGS4 Innovation and Entrepreneurship in Food Industries 4 Cr.

This course introduces students to food product development and extrapolation to industrial contexts using pilot installations.
Topics include: process flowchart design, key physical, chemical, and biochemical transformation mechanisms, biological and microbiological transformation processes, packaging-based stabilization, identification of key process points, and project execution.

076INM1S1 Introduction to Marketing 2 Cr.

This course presents the fundamental concepts of marketing, including market analysis, consumer behavior, product positioning, and communication strategies. It emphasizes the specifics of agri-food marketing and adapting to global market changes and customer needs.

028INENI1 Introduction to Engineering 2 Cr.

This course provides an overview of various engineering fields, highlighting their role in technological and industrial advancement. It introduces fundamental concepts of design, modeling, and technical problem-solving, with a special focus on applications in agriculture and agri-food.

028INPYI4 Introduction to Python 2 Cr.

This course introduces students to programming in Python, known for its simplicity and versatility. Students will learn the basics: variables, data types, conditionals, loops, functions, and file handling, with practical applications in agri-food data processing and task automation.

435LALML2 Arabic Language and Media 2 Cr.

This course develops students' proficiency in Arabic by engaging in critical analysis of written, audiovisual, and digital texts. It enhances reading comprehension, writing, and oral communication skills, while fostering an understanding of discourse, rhetoric, and the role of media in contemporary society.

028TLESI4 Talent Management and Strategic Leadership 2 Cr.

This course explores methods for identifying, developing, and retaining talent within organizations. It highlights strategic leadership skills, team motivation, and change management. Students will learn to design human resource strategies that align with ethical and performance goals in today's competitive environment.

064VALEL1 USJ Values in Daily Life 2 Cr.

This course aims to raise students' awareness of the core values of the Saint Joseph University of Beirut (USJ) and to encourage them to apply these values in their personal, interpersonal, and professional lives. It engages them in a critical reflection on how the principles enshrined in the USJ Charter can influence their behavior, actions, and decisions in addressing the challenges of today's world. Students will also develop an understanding of global issues and ethical responsibilities, preparing them to contribute positively to the building of a better society.

076MSPRS5 Statistical Process Control 2 Cr.

This course provides essential knowledge for controlling critical parameters in industrial processes, from personnel training to the implementation of control charts.
Topics include: fundamentals of statistical process control, purpose and principles of in-process quality control, comparison of tolerances vs. process variation, control charts, and practical applications.

076MSCAS5 Supply Chain and Logistics Management 4 Cr.

This course examines the integrated management of materials, information, and product flows throughout the supply chain. Students will explore strategies for optimizing inventory, transportation, procurement, and distribution, with a focus on the agri-food industry. The goal is to ensure efficient, sustainable, and responsive logistics in line with market demands.

076MQSES5 Quality, Health, Safety, and Environment Management 4 Cr.

This course introduces students to integrated management systems (QHSE), covering international standards (ISO 9001, ISO 45001, ISO 14001), occupational risk prevention, workplace safety, environmental protection, and quality assurance. Students will learn to implement continuous improvement initiatives tailored to the agri-food sector.

076MFABS5 Managerial Finance for Agribusiness 4 Cr.

This course introduces financial principles applied to the agri-food sector. Topics include financial analysis, cash flow management, cost calculation, investment evaluation, and budgetary decision-making. Students learn to use financial tools to plan, monitor, and optimize the economic performance of agricultural and food enterprises.

028MATHI1 Mathematics for Engineers 4 Cr.

This course connects fundamental mathematics (sequences and functions) to real-world agricultural applications. It aims to spark student interest by showing how mathematics helps model agricultural phenomena such as growth, yield, and financial management in farms.

028PHY3I3 Fluid Mechanics 2 Cr.

This course informs future engineers about the importance of structural stability and appropriate sizing, while reviewing the materials used in engineering.
Topics include: introduction to fluid mechanics, fluid statics, dynamics of ideal and incompressible fluids, viscous incompressible fluids, and compressible fluids.

028MDFES6 Final Year Project 30 Cr.

This course initiates students into a pre-professional or research activity by exploring and testing new techniques for application in companies or farms. The project culminates in a written thesis and a defense before a panel of experts.
Spanning at least six months, the project involves experimental work, data collection and analysis, and presentation of results. Topics may relate to plant or animal production, economics, forestry, or other areas.

076MGPRS5 Project Management Methodology 2 Cr.

This course teaches key steps in project management: goal definition, planning, resource management, risk assessment, monitoring, and closure. Using tools like Gantt charts and PERT methods, students learn to structure and manage projects effectively—particularly in the agri-food domain—while meeting deadlines, budgets, and quality standards.

076MEUPS3 Milling and Bakery 2 Cr.

This course addresses the shortage of skilled professionals in this field in Lebanon by integrating specialized training in the agri-food sector.

It covers the entire wheat-to-bread chain, offering comprehensive training in breadmaking and pasta production—from wheat grain to final baked products.

076MCRAS2 Food Microbiology 2 Cr.

This course raises awareness of consumer health protection through examples of food risks and crises. It introduces students to microorganisms in food and their behavior during processing, as well as the consequences of their development.
Topics include: food hygiene and safety, biological, chemical, and radioactive contaminants, microbial behavior in food, foodborne infections and intoxications (digestive and non-digestive), opportunistic pathogens, molds and mycotoxins, viral and parasitic infections, foodborne illness investigations, and analysis of food microflora (both beneficial and harmful).

028MICRI4 General Microbiology 4 Cr.

This course introduces students to microbial function (bacteria, viruses), their role in agriculture (soil-plant systems, phytopathology), and their use in food industries (fermentation, contamination). It also deepens knowledge of human immunology.
Topics include: general microbiology, bacterial pathogenicity, viruses, soil microbiology, medical, agricultural, and food applications (e.g., wastewater treatment), and lab sessions (microbial cultures, identification, and isolation techniques).

076COCNS2 Nutrition and Communities 2 Cr.

This course explores nutrition and food practices among individuals, households, and community groups. It examines the dietary consumption patterns of different community categories worldwide and the socioeconomic, cultural, and psychological factors influencing eating behaviors. Students will learn to develop evaluation, planning, and intervention programs that protect public health, along with basic methods of nutrition education tailored to small groups.

028NUTRI4 Human Nutrition 4 Cr.

This course, as the study of human interactions with food, examines the biological processes related to nutrient use, food health, and nutritional requirements.
Topics include: food and nutrients; proteins, carbohydrates, and fats; dietary fiber; vitamins; water and minerals; trace elements; beverages (importance and nutritional composition); protein-rich foods; fruits and vegetables; cereals and cereal-based products; culinary fats; food additives; and dietary principles.

076OENLS4 Oenology 2 Cr.

This course introduces oenology, the art and science of wine, covering grape growing, harvesting, winemaking, aging, storage, and tasting.
Topics include: understanding the vine; fermentation agents and raw materials; winemaking techniques; wine aging and preservation; clarification and stabilization methods; and common wine faults and diseases.

076OPU1S1 Unit Operations I 4 Cr.

This course covers the physicochemical methods used to isolate, purify, or identify the constituents of a mixture. It addresses the principles and applications of techniques such as filtration, decantation, distillation, extraction, chromatography, and centrifugation. These techniques are essential in the fields of chemistry, biochemistry, agri-food, and environmental science. The course's objective is to enable students to choose and apply the most suitable separation method based on the nature of the mixture and the desired outcome (analysis, purification, production).

076OPU2S3 Unit Operations II 4 Cr.

This course deals with the fundamental unit operations used in industrial transformation processes within the agri-food sector. It covers techniques such as drying, evaporation, absorption, distillation, filtration, and other

methods of mass and energy transfer. Each operation aims to separate, purify, or transform substances at different stages of production. Students will learn the underlying physical and thermodynamic principles, material and energy balances, as well as the criteria for selecting and optimizing processes. The objective is to enable them to understand these processes.

076OMQPS4 Quality and Production Management Tools 2 Cr.

This course presents key tools and methods to improve quality and production efficiency. Students will explore approaches such as Lean Management, 5S, Pareto diagrams, FMEA (Failure Modes and Effects Analysis), and control charts. They will also learn to identify inefficiencies, enhance performance, and implement corrective actions in agri-food or industrial settings.

076OIAPS1 Applied Computer Tools 2 Cr.

This course introduces students to the use of computer tools specific to the agri-food industries, related to production, quality control, traceability, and data management. It covers the use of production management software (ERP), process modeling and simulation, computer-aided quality control, as well as the exploitation of databases and statistical processing tools. Particular attention is paid to digital technologies that allow for the optimization of processing chains, ensuring compliance with sanitary standards, and facilitating decision-making. The course prepares students to effectively integrate digital tools into a modern, connected, and competitive agri-food environment.

076PEPMS2 Experimental Design I 2 Cr.

This course covers the statistical methods used to design, analyze, and optimize mixtures of components with the goal of obtaining a product with desired properties. Unlike traditional experimental designs, mixture designs account for the fact that the sum of component proportions is constant. Students will learn how to model responses (texture, taste, viscosity, etc.) based on ingredient proportions, interpret results, and determine optimal formulations.

076PLEXS4 Experimental Design II 2 Cr.

This course focuses on various tools for creating an appropriate experimental design for a given situation (optimizing an industrial process, an analytical method) and on the statistical processing of the resulting data. Topics include: Introduction to experimental designs, r and R tests, Full factorial designs, Fractional factorial designs, Latin square designs, Screening designs and Taguchi method

028POAGS2 Agricultural and Food Policies 2 Cr.

This course encourages students to analyze the state of agriculture in Lebanon, identify its challenges, and propose viable solutions. It also broadens students' global awareness through the study of significant events that have shaped Lebanon's agricultural scene.
Topics include: definition and tools of agricultural policy, comparative analysis of major agricultural policies, the agricultural situation in Lebanon, and agricultural economics.

028PRSTI3 Probability and Statistics 4 Cr.

This course covers both descriptive statistics (measures of central tendency, dispersion, skewness, and kurtosis, and data visualization) and inferential statistics (hypothesis testing). Students will gain theoretical knowledge and practical skills to apply statistical concepts to real-world research problems in agronomic and agri-food sciences.
Topics include: introduction to statistics, descriptive statistics, normal distribution, sampling theory, hypothesis testing (chi-square, t-test, ANOVA), correlation and linear regression, non-parametric tests, and multivariate statistics.

028REOPS2 Operational Research 2 Cr.

This course equips engineers with scientific knowledge to manage investments and adjust portfolios while considering risk and return. It introduces operational research methods and probability laws to support rational, data-driven decision-making among alternative solutions within enterprises.

076RHOAS4 Rheology and Food Texture 2 Cr.

This course aims to teach students how to analyze and characterize the structure and behavior of food materials a key criterion of sensory quality (texture) using rheological techniques applicable in the food industry.
Topics include: fundamental concepts of rheology, and the behavior of food materials under deformation and flow.

028SCENI2 Environmental Sciences 2 Cr.

This course familiarizes students with environmental issues, starting with its fundamental components, identifying the problems caused by human activity, and analyzing their causes and potential solutions.
Topics include: the environment and its history, environmental sciences, environmental stress factors, impacts, environmental protection, and laws and regulations.

076SGDES5 Science, Engineering, and Environmental Sustainability 2 Cr.

This course combines scientific fundamentals with engineering tools for sustainable natural resource management. It addresses soil, water, and air pollution; waste treatment; renewable energy; and strategies to reduce environmental impacts from agri-food activities. Students will develop an integrated approach to designing environmentally responsible solutions.

076SEMIS5 Seminar 2 Cr.

This seminar provides a space for discussion and reflection on current issues in agriculture, agri-food, and the environment. Students will engage in presentations, debates, and workshops to build communication skills, critical thinking, and teamwork. The module deepens cross-cutting topics and familiarizes students with sectoral challenges.

028SIGDS5 GIS: Diagnostic and Forecasting Tool 2 Cr.

This course introduces Geographic Information Systems (GIS) as tools for spatial analysis used in territorial diagnostics and environmental forecasting. Students will learn to collect, process, map, and interpret geolocated data to manage agricultural resources, monitor soil changes, plan land use, and anticipate natural risks using specialized software.

076STG2S1 Internship 2 2 Cr.

This internship allows students to apply the theories learned during the academic year, observe them in practice, and become familiar with the professional world through training in a research institute or production company in Lebanon or abroad.
Activities include: one month of research and laboratory work on agricultural products (e.g., IRAL, IRI), and one month of hands-on experience in an agricultural operation during summer.

076STG3S3 Internship 3 2 Cr.

This internship provides students the opportunity to apply theoretical knowledge in a professional environment.
Activities include: one month of research and lab analysis of agricultural products at a research institute (IRAL, IFAD, IRA), and one month of fieldwork in an agricultural operation during summer.

076STAPS1 Applied Statistics 2 Cr.

This course aims to provide students with various tools for processing and statistical analysis of data in agronomic and agro-food sciences. It also aims to develop critical thinking regarding such data.
Topics include: Introduction to statistics. Goodness-of-fit tests: chi-square test. Normality tests. Relationship between two variables: one qualitative and one quantitative [t-test and ANOVA]. Relationship between two qualitative variables [chi-square test of independence]. Relationship between two quantitative variables [Pearson correlation]. Non-parametric tests [Mann-Whitney, Kruskal-Wallis, Spearman, etc.], [multi-factor ANOVA]. Multivariate analyses [MANOVA, MANCOVA, repeated measures ANOVA, mixed model]. Simple and multiple regression analysis.

028TEXPI1 Expression Techniques in AI Era 4 Cr.

This course trains future agronomy and agri-food engineers in communication within academic and professional settings. It provides linguistic and methodological tools for mastering oral and written communication. Students will also develop general skills needed for specialty courses**.**
Topics include: reformulation, referencing, reports and minutes, oral presentations, scientific communication, job application documents, and formal letters/emails.

076TLAIS4 Dairy Technology 4 Cr.

This course explores the role of microorganisms in food processing using practical examples such as cheese and other dairy products.
Topics include: milk biochemistry, microbiology, preservation and treatment methods, drinking milk technology, frozen milk technology, fermented product technology, cheese production, and fat-based products (butter, margarine, etc.).

028TECAI4 Food Technologies 4 Cr.

This course provides the necessary knowledge concerning Food Technology in the broad sense. This includes the techniques for food production, processing, and preservation, all based on the chemical and physical behavior of nutrients.

028PHY1I1 Thermodynamics 2 Cr.

This course develops students' scientific reasoning and establishes the foundational principles of engineering.
Topics include: thermometry, ideal gases, calorimetry, transformations, first and second laws of thermodynamics, and thermodynamic state functions (U, H, S, F, G), as well as physical equilibria.

028TOATI1 Topography and Land Planning 2 Cr.

This course introduces students to land measurement and representation techniques. They will learn to use surveying instruments for accurate topographic data and to design development plans tailored to agricultural and rural projects. Emphasis is placed on practical applications to optimize sustainable land use.

076TRECS1 Drinking Water Treatment: From Source to Consumer 2 Cr.

This course provides fundamental information regarding the crucial issues related to drinking water treatment, an essential resource for public health and sustainable development. It presents the various steps and technologies used to transform raw water, from diverse natural sources, into safe drinking water that complies with the strictest quality standards.

028PHY4I4 Heat Transfer 2 Cr.

This course explains the physical phenomena of heat and energy transfer relevant to agriculture and food industries.
Topics include: energy sources and forms, renewable energy, key definitions and units, modes of heat transfer (conduction, convection, radiation), and practical applications.

028TRMAI3 Mass Transfer 2 Cr.

This course covers transport phenomena in biological and food systems, including diffusion, absorption, and convection. Students will study the physical and chemical mechanisms involved and their influence on product quality and preservation-key knowledge for mastering industrial processing.

076TATRS4 Advanced Processing Technologies 2 Cr.

This course explores innovative processes for transforming agricultural raw materials into high-value products such as peanut butter and carob molasses. Students will study production techniques, quality control parameters, and strategies for optimizing industrial processes with a focus on innovation, sustainability, and local resource valorization.

076TEHAS3 Edible Oil Technology 2 Cr.

This course introduces students to the production, processing, and valorization of oils and fats intended for human consumption. It covers the entire supply chain, from the extraction of vegetable and animal oils to their refining, packaging, and use in various food products.
The course emphasizes the physicochemical and nutritional properties of oils, their functional roles in formulations, and quality control and preservation techniques. Special attention is given to food safety, regulations, and sustainability innovations, including by-product valorization and the use of alternative oils. By the end of the course, students will be able to understand and analyze technological processes applied to food oils and contribute to the development of products that meet quality, performance, and international standards.

076TOX1S1 Toxicology I 2 Cr.

This course introduces the basic principles of toxicology—the study of chemical effects on living organisms. Students will learn about dosage, exposure, acute and chronic toxicity, and mechanisms of action. Risk assessment methods are discussed, with a focus on agricultural and food-related chemicals.

076TOX2S2 Toxicology II 2 Cr.

This course deepens the analysis of toxic effects from contaminants, pesticides, additives, and chemicals on human and animal health. Topics include exposure routes, toxicokinetic, biomarkers, detection methods, and regulatory frameworks for food safety and risk management in the agri-food sector.

028VCACS3 Volunteer and Citizen Action 2 Cr.

This course explores the vital role of volunteering and citizen action in promoting social change, strengthening communities, and fostering democratic participation. Students will investigate the historical, theoretical, and practical dimensions of civic engagement across various sectors, including non-profit organizations, social movements, and local government.