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 (2.5 years)

OBJECTIVES

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

- Act as mediators between science and agro-food practice
- Develop products through effective production methods and quality control
- Contribute to the development of quality, nutrition, and health
- Pursue advanced studies at prestigious universities.

PROGRAM LEARNING OUTCOMES (COMPETENCIES)

- Implement and/or operate a competitive and sustainable food industry production system
- Prevent, diagnose, and solve issues within a food industry unit
- Manage food industry entities with strong managerial and leadership skills Act as entrepreneurs in the Food Industry sector
- Develop research projects to improve production methods and food industry product quality
- Implement food industry development projects
- Communicate effectively with and train stakeholders in the Food Industry sector
- Exhibit professionalism and ethical behavior in their interactions.

ADMISSION REQUIREMENTS

- **Admission to the First Year of the Preparatory Cycle (Semester 1)**
  Candidates are selected through various methods based on their specialty, including:
  - School records (admission file)
  - Admission by qualifications (title)

  Three admission periods for the first cycle: early, regular, late
- **Admission to the Second Year of the Preparatory Cycle (Semester 4)**
  Candidates must validate 90 ECTS credits at the Faculty of Science of USJ (Bachelor in Chemistry or Bachelor in Life and Earth Sciences – Biochemistry program).
- **Admission to the Engineering Cycle (Semester 5):**
  Candidates must hold a Bachelor in Chemistry or Bachelor in Life and Earth Sciences – Biochemistry program, Bachelor in Nutrition and Dietetics, or equivalent.

PROGRAM REQUIREMENTS

300 credits: Required courses (256 credits), Institution's elective courses (36 credits), Open elective courses (8 credits).

USJ General Education Program (32 credits, may be part of the above categories).
USJ General Education Program (32 credits)
English: 4 Cr.
English Language Level A: 4 Cr.
Arabic: 4 Cr.
Arabic Language (Required Open Elective): 2 Cr.
Professional Ethics: 2 Cr.
Introduction to Agriculture and Agro-Food: 2 Cr.

Humanities: 8 Cr.
Professional Ethics: 2 Cr.
Training in Muslim -Christian Dialogue: 2 Cr.
Voluntary and Citizen Action : 2 Cr.
Personal Development and Organizational Behavior: 2 Cr.
USJ Values in Daily Life: 2 Cr.
Social Sciences: 6 Cr.
Innovation and Entrepreneurship – Project Simulation: 6 Cr.
Business Management: 2 Cr.
Marketing: 4 Cr.
Quantitative Techniques: 6 Cr.
General Mathematics: 2 Cr.
Probability and Statistics: 4 Cr.
Digital Environment: 4 Cr.
Communication Techniques: 4 Cr.
Expression Techniques: 4 Cr.

Fundamental Courses (292 credits)

The program spans 5 years and is divided into two cycles: the preparatory cycle (2 years, 4 semesters) and the Agro-food engineering cycle (3 years, 6 semesters).

PREPARATORY CYCLE

Required Courses in the Preparatory Cycle (110 credits)
Algebra (4 Cr.). Analysis 1 (4 Cr.). Analysis 2 (4 Cr.). Metabolic Biochemistry (2 Cr.). Structural Biochemistry (4 Cr.). Plant Biology 1 (4 Cr.). Plant Biology 2 (2 Cr.). Botany (Plant Systematics) (4 Cr.). Analytical Chemistry (4 Cr.). Solution Chemistry (4 Cr.). General Chemistry (4 Cr.). Organic Chemistry (4 Cr.). Personal Development and Organizational Behavior (2 Cr.). Fundamental Ecology (2 Cr.). General Economics (2 Cr.). Electricity and Mechanics (2 Cr.). Digital Environment (4 Cr.). General Genetics (2 Cr.). Geography (4 Cr.). Geology (2 Cr.). Introduction to Agriculture and Agri-food (2 Cr.). Introduction to Agriculture 2 (2 Cr.) Arabic Language (2 Cr). General Mathematics (2 Cr.). Fluid Mechanics (2 Cr.). General Microbiology (4 Cr.). Human Nutrition (4 Cr.). Animal Physiology (4 Cr.). Plant Physiology (4 Cr). Probability and Statistics (4 Cr.). Environmental Sciences (2 Cr.). Expression Techniques (4 Cr.). Thermodynamics (2 Cr.). Heat Transfer (2 Cr.). USJ Values in Daily Life (2 Cr.). Zoology (Animal World Organization) (4 Cr.)

Institution's Elective Courses in the Preparatory Cycle (6 credits)
Three courses to choose from the following list:
Database (Computer Science 3) (2 Cr.). Environmental Chemistry (2 Cr.). Accounting and Management Tools (2 Cr.). Ethics in the Agri-food Industry (2 Cr.). Forest Management (2 Cr.). Foodborne Illnesses (2 Cr.)

Open Elective Courses in the Preparatory Cycle (4 credits)

SUGGESTED STUDY PLAN

Semester 1

Code	Course Name	Credits
028ANA1I1	Analysis 1	4
028BIV1I1	Plant Biology 1	4
028CHIGI1	General Chemistry	4
028ENNUI1	Digital Environment	4
028GÉOGI2	Geography	4
028MATHI1	General Mathematics	2

028TEXPI1	Expression Techniques	4
028PHY1I1	Thermodynamics	2
	Open Elective	2
Total		**30**

Semester 2

Code	Course Name	Credits
028ALGEI2	Algebra	4
028BOTAI2	Botany (Plant Systematics)	4
028CHISI2	Solution Chemistry	4
028DEVCI2	Personal Development and Organizational Behavior	2
028ECOLI1	Fundamental Ecology	2
028PHY2I2	Electricity and Mechanics	2
028GÉOLI2	Geology	2
028INAGI1	Introduction to Agriculture and Agri-food	2
028ZOOLI2	Zoology (Animal World Organization)	4
	USJ Values in Daily Life (General Education)	2
	Institution's Elective	2
Total		**30**

Semester 3

Code	Course Name	Credits
028ANA2I3	Analysis 2	4
028BCHSI3	Structural Biochemistry	4
028BIV2I3	Plant Biology 2	2
028CHIOI3	Organic Chemistry	4
028GENEI3	General Genetics	2
028PHY3I4	Fluid Mechanics	2
028PRSTI3	Probability and Statistics	4
028SCENI3	Environmental Sciences	2
028STG1I3	Introduction to Agriculture 2	2
	Institution's Elective	2
	Open Elective	2
Total		**30**

Semester 4

Code	Course Name	Credits
028BCHMI4	Metabolic Biochemistry	2
028CHIAI4	Analytical Chemistry	4
028ECOGI4	General Economics	2
028MICRI4	General Microbiology	4
028NUTRI4	Human Nutrition	4

028PHANI4	Animal Physiology	4
028PHVEI4	Plant Physiology	4
028PHY4I4	Heat Transfer	2
	Arabic Language (General Education)	2
	Institution's Elective	2
Total		**30**

ENGINEERING CYCLE

Required Courses in the Engineering Cycle (146 credits)
Voluntary and Citizen Action (2 Cr.). English 4 (4 Cr.). Application of Quality Management Systems (4 Cr.). Quality Assurance and Risk Management (4 Cr.). Basics of GIA (4 Cr.). Food Biochemistry (4 Cr.). Statistical Bioinformatics (2 Cr.). Conditioning and Packaging (4 Cr.). Market Economics (2 Cr.). Packaging of Food Products (4 Cr.). Equipment for the Food Industries (2 Cr.). Study of Industrial Tools (4 Cr.). Industrial Fermentation (4 Cr.). Fluids and Energy (2 Cr.). Training in Muslim -Christian Dialogue (2 Cr.). Production Management (2 Cr.). Business Management (2 Cr.). Hydrology (2 Cr.). Ingredients - Additives and Flavorings (2 Cr.). Innovation and Entrepreneurship - Manufacturing and Analysis of a Food Product (4 Cr.). Innovation and Entrepreneurship - Project Simulation (6 Cr.). Integration into the Company (4 Cr.). Marketing (4 Cr.). End of Study Project (30 Cr.). Food Microbiology (2 Cr.). Unit Operations (4 Cr.). Process Optimization and Operational Research (2 Cr.). Pedology (4 Cr.). Pyrotechnics (4 Cr.). Experimental Plans (4 Cr.). Agricultural and Food Policies (2 Cr.). Internship 2 (2 Cr.). Internship 3 (2 Cr.). Supply Chain Management (4 Cr.). Industrial Waste Management Techniques (4 Cr.). Food Technology (2 Cr.). Company Visits (2 Cr.). Zootechnics and Animal Products (4 Cr.).

Institution's Elective Courses in the Engineering Cycle (30 credits)
30 credits to choose from the following list:
Sensory Analysis (2 Cr.). Beekeeping (4 Cr.). Computer-Aided Drawing (AutoCAD) (2 Cr.). Study of a Unit Operation (3 Cr.). Management of Agricultural and Industrial Effluents (2 Cr.). Energy and Fluid Management (3 Cr.). AI in Agriculture and Agri-Food (4 Cr.). Meat and Fish Products Industry (2 Cr.). Spirits Industry (2 Cr.). Mastery of Industrial Processes (3 Cr.). Flour Milling and Bread Making (IAA) (2 Cr.). Oenology (2 Cr.). Aromatic and Medicinal Plants (4 Cr.). Programming (2 Cr.). Rheology of Food Products (2 Cr.). Quality Systems in Business Management (4 Cr.). Dairy Techniques (4 Cr.). Olive Oil Technology (2 Cr.). Water Treatment and Technologies (2 Cr.).

Open Elective Courses in the Engineering Cycle (4 credits)

SUGGESTED STUDY PLAN

Semester 1

Code	Course Name	Credits
028ECOAS1	Market Economics	2
028GESTS1	Business Management	2
028HYDRS1	Hydrology	2
028MARKS1	Marketing	4
028PÉDOS1	Pedology	4
028STG2S1	Internship 2	2
028TECAS1	Food Technology	2
028ZOOTS1	Animal Farming and Products	4
	Institution's Elective	6
	Open Elective	2
Total		**30**

Semester 2

Code	Course Name	Credits
028ANG4S2	English 4	4
076BCHAS2	Food Biochemistry	4
028INOVS2	Innovation and Entrepreneurship - Project Simulation	6
076MCRAS2	Food Microbiology	2
028OPROS2	Process Optimization and Operations Research	2
028PHYTS2	Phytotechny	4
028POAGS2	Agricultural and Food Policies	2
	Voluntary and Citizen Action (General Education)	2
	Institution's Elective	4
Total		**30**

Semester 3

Code	Course Name	Credits
076BGIAS3	Fundamentals of GIA	4
076EMBAS3	Food Packaging	4
076FERIS3	Industrial Fermentation	4
076BIOIS3	Bioinformatics Statistics	2
076INGAS3	Ingredients - Additives and Flavors	2
076OPEUS3	Unit Operations	4
028STG3S3	Internship 3	2
	Institution's Elective	6
	Open Elective	2
Total		**30**

Semester 4

Code	Course Name	Credits
076AQGRS4	Quality Assurance and Risk Management	4
076EQIAS4	Equipment for the Food Industries	2
076FLENS4	Fluids and Energies	2
076GEPRS4	Production Management	2
076DIAGS4	Innovation and Entrepreneurship - Food Product Fabrication and Analysis	4
076PLEXS4	Experimental Design	4
076VISIS4	Company Visits* (Arabic)	2
	Muslim -Christian Dialogue (General Education)	2
	Institution's Elective	8
Total		**30**

Semester 5

Code	Course Name	Credits
076APPQS5	Application of Quality Management Systems	4
076OUTIS5	Industrial Tool Study	4
076INSES5	Integration into the Company	4
076MNPRS5	Supply Chain Management	4
076CONDS5	Packaging and Wrapping	4
076DECHS5	Industrial Waste Management Techniques	4
	Institution's electives	6
Total		**30**

Semester 6

Code	Course Name	Credits
028MDFES6	End of Study Project	30
Total		**30**

COURSE DESCRIPTION

015ABC2L3 Voluntary and Citizen Action 2 Cr.

This course is part of the USJ General Education Program. It aims to raise awareness among all students about the importance of their involvement in civic life by providing them with opportunities to engage in various volunteer activities. The course consists of two components: theoretical instruction and supervised practical activities.

028ALGEI2 Algebra 4 Cr.

This course aims to solidify essential algebraic concepts, including matrix calculus, solving linear systems, and endomorphism reduction, equipping students with critical techniques for applications in fields like computer science, hydraulics, heat transfer, statistics, and data analysis. Topics include:

- Reduction of endomorphisms and square matrices
- Vector spaces and linear applications
- Algebraic structures
- Matrices and matrix calculus
- Determinants and linear systems

028ANA1I1 Analysis 1 4 Cr.

This course aims to provide fundamental concepts in analysis, structured as an elementary first-year course with carefully demonstrated results. It is designed to help students develop sound reasoning skills. Topics include functions of a real variable, differentiability, and standard functions.

028ANA2I3 Analysis 2 4 Cr.

This course introduces students to fundamental theoretical concepts of differential equations, along while also explaining numerical methods for effectively solving them. It also covers integral calculus, including double and triple integrals, line integrals, Green-Riemann theorem, and operations on Laplace transformations and their applications. LaPlace transformation, Taylor series, integral calculus, double integrals, numerical sequences, triple integrals, and differential equations.

076ANSES4 Sensory Analysis 2 Cr.

This course explores the growing role of sensory analysis in the agri-food industry for enhancing food's organoleptic qualities. It also demonstrates the variety of food preferences shaping diets. Topics include sensory perceptions (flavors and aromas), sensory tests, reference mapping, panel management, and statistical analysis of results.

028ANG4S2 English 4 4 Cr.

This course focuses on acquiring terminology related to agriculture (soil, plant and animal production, agricultural issues), Agro-food (food products, industrial processes, regulations). It aims to master the English language for oral and written communication in the field of specialization, group interaction, and critical thinking development in the language of specialization, as well as professional integration.
Course topics include soils, plants, vegetables, fruits, organic vs. conventional agriculture, agribusiness, animals, vocabulary tests, oral presentations on sustainable farming systems, debates, essays, introduction to the food industry, scientific report techniques, food manufacture, food additives, sensory evaluation, case studies, and more.

028APICS2 Beekeeping 4 Cr.

This course familiarizes students with the rearing and care of bees to optimize the production of honey, wax, and royal jelly, the main products of the hive.
Topics include an introduction to bee colonies, insect physiology, colony behavior, beekeeping, and the composition and quality of honey (royal jelly, wax).

076APPQS5 Application of Quality Management Systems 4 Cr.

This course specifies the requirements for a food safety quality management system. It is designed for organizations seeking to demonstrate their ability to consistently provide products that meet customer, legal, and regulatory requirements. It emphasizes customer satisfaction through effective system implementation, continuous improvement processes, and the assurance of safe products in accordance with relevant standards. Topics include general principles of food hygiene and guidelines for good hygiene practices.

076AQGRS4 Quality Assurance and Risk Management 4 Cr.

This course emphasizes the shift from post-production control to a preventive quality assurance policy within the agro-food industry. It familiarizes students with international quality assurance standards (HACCP, ISO) and risk management techniques for production. Topics include: The general principles of quality assurance, Good Hygiene Practices Guide (GBPH), The 5 M's of hygiene, Cleaning and disinfection, Control measures, Waste management (served vs. presented products), Pest management, kitchen workshop organization, Food quality (4S), Traceability, The steps and principles of HACCP.

076BGIAS3 Fundamentals of Agro-food Engineering 4 Cr.

This course provides foundational tools for understanding, calculating, and extrapolating within the context of industrial engineering, which emerged in the early 20th century to support the rapid growth of various industries. It introduces the conceptual basics of agro-food process engineering, focusing on transfers and equilibrium, pasteurization and sterilization, thermal destruction of microorganisms, and balance calculations.

028INF3I3 Database (Computer Science 3) 2 Cr.

This course aims to teach students how to design a small relational database using Microsoft Access database management system (DBMS).
Topics include: Tables, Queries, Software introduction, Reports, and Forms.

076BCHAS2 Food Biochemistry 4 Cr.

This course provides students with the tools, methods, and basic knowledge necessary to understand the biochemical transformations occurring during food production and preservation. Topics include general information about food constituents and the biochemistry of main foods.

028BCHMI4 Metabolic Biochemistry 2 Cr.

The goal of this course is to understand the metabolism of various cellular compounds and the concepts of controlling metabolic pathway activities.
It covers cellular processes that generate energy by analyzing energy transformations in plant and animal cells, covering the basic principles of cellular respiration and photosynthesis. Topics include an introduction to metabolism and bioenergetics, Carbohydrate metabolism, Krebs cycle, Electron transport chain and oxidative phosphorylation, Lipid metabolism, Protein metabolism, and Photosynthesis.

028BCHSI3 Structural Biochemistry 4 Cr.

This course focuses on the structure and physico-chemical properties of molecules that constitute living matter: carbohydrates, amino acids, proteins, lipids, membranes, nucleotides, and nucleic acids. It examines the characteristics and biological roles of these molecules as constituents of living matter or catalysts in metabolic reactions. The course also covers biochemical analyses used for the quantification, separation, and characterization of these biomolecules.
Topics include amino acids and proteins, protein analysis methods, biological membranes, enzymes, carbohydrates, nucleic acids (DNA and RNA), fatty acids and lipids, and biological membranes.

028BIOIS4 Bioinformatics Statistics 2 Cr.

This course provides students with various tools for the statistical treatment and analysis of data in agronomic and Agro-food sciences, while fostering a critical mindset regarding data interpretation.
Topics include: Introduction to statistics, Goodness-of-fit tests: chi-square test, Normality tests, Relationship between two variables: qualitative and quantitative [t-test and ANOVA], Relationship between two qualitative variables [chi-square independence test], Relationship between two quantitative variables [Pearson correlation], Non-parametric tests [Mann-Whitney, Kruskal-Wallis, Spearman, etc.], [Multi-factor analysis of variance], Multivariate analyses [MANOVA, MANCOVA, Repeated measures ANOVA, mixed model], Simple and multiple regression analysis.

028BIV1I1 Plant Biology 1 4 Cr.

This course aims to provide students with basic knowledge of plant macroscopic and microscopic structures to facilitate understanding of the physiological functions and production techniques studied during the engineering cycle. This course focuses on higher plants, which encompass most cultivated plants.
Topics include: General introduction, Stem, Leaf, Root, Vegetative propagation, Organization of angiosperm flowers, Cormophytes' lifestyles, Meristems and primary tissues, Fruit, Reproductive biology, Secondary structures.

028BIV2I3 Plant Biology 2 2 Cr.

This course enables students to understand the organization of lower plants (algae, fungi, etc.), which are crucial in agricultural sciences (plant diseases...) and in the agri-food sector (additives, fermentation yeasts, etc.).
Topics include: Algae, Pteridophytes, Fungi, Bryophytes, Towards flowering plants: "pre-phanerogams" or "pre-spermatophytes".

028BOTAI2 Botany (Plant Systematics) 4 Cr.

Students will learn to classify flora, recognize major plant families in situ, and establish a herbarium according to standards.
Topics include Introduction, Major divisions, Principles of taxonomy and the concept of plant evolution, Phylum of spermatophytes (phanerogams) or seed plants, Subphylum of angiosperms.

028CCP4S1 Career Coaching and Personal Branding 4 Cr.

This course aims to align students' aspirations with the professional reality of the working world and enterprises. It involves positioning oneself within an activity sector, a professional branch, and a specific profession. The goal is to develop a professional project that facilitates orientation toward planned internships, future training, or upcoming employment.

028CHIAI4 Analytical Chemistry 4 Cr.

By the end of this course, students will be able to define the necessary steps for preparing a sample for analysis, understand and master the main techniques for extracting organic molecules, as well as understand and master the main techniques for extracting minerals. Students will also master the main spectroscopic and chromatographic techniques, critically read a scientific article, and analyze various types of chromatograms.
Topics include sampling, techniques for extracting organic compounds, techniques for extracting minerals, chromatography, gas chromatography (GC), liquid chromatography (HPLC), atomic absorption, ICP-MS, and dosages.

028CHISI2 Solution Chemistry 4 Cr.

By the end of this course, students will be able to define different types of chemical reactions, recognize basic concepts related to chemical kinetics, recognize basic concepts related to chemical equilibrium. Students will also solve equilibrium problems, characterize and differentiate acids and bases, recognize applications of equilibrium in aqueous media, understand basic concepts in electrochemistry, and use the concept of electrode potential in various applications.

028CHENI2 Environmental Chemistry 2 Cr.

This course provides agronomy and agri-food students with the tools necessary to understand chemical and anthropogenic issues associated with the environment. They will characterize molecular processes governing the functioning and evolution of natural ecosystems: atmosphere, water, and soil. This course begins with an overview of the major environmental compartments, and then presents the chemistry and physico-chemistry of molecules in these different compartments. By the end of the course, students will be equipped to develop eco-friendly production techniques, implement effective natural resource management policies, and create solutions to contamination and pollution challenges.

028CHIGI1 General Chemistry 4 Cr.

This course provides students with basic concepts in chemistry to establish a solid foundation for studying organic and analytical chemistry, which are essential for understanding food chemistry and biochemistry.
Topics include: Atom, Periodic table of elements, LEWIS model of molecules and ions, Association of atoms: molecules and ions, LEWIS model of molecules and ions, Mesomerism, Polarity of molecules, and States of matter.

028CHIOI3 Organic Chemistry 4 Cr.

This course introduces students to fundamental concepts in structure, nomenclature, stereochemistry, and reaction mechanisms, ensuring mastery of the corresponding terminology. This course further integrates these concepts into the study of organic reaction mechanisms and various addition and substitution reactions.
Topics include an introduction to organic chemistry, stereochemistry, conformations, physical organic chemistry, organic reaction mechanisms, reactivity of simple organic functions (alkanes, alkenes, alkynes, organ magnesium compounds, halogenated derivatives, and alcohols), nomenclature, and practical organic chemistry.

028COMMI2 Communication 2 Cr.

This course introduces future societal actors to essential techniques and tools for effective oral communication, with a focus on adapting to different interlocutors, including professional and societal groups.

028COMBI2 Communication Skills and Business Etiquette 4 Cr.

This course introduces future societal actors to essential techniques and tools for both oral and non-verbal communication, with a focus on adapting to different interlocutors, including professional and societal groups.
Topics include an introduction to communication and its importance in business, different types of interpersonal communication, and oral nonverbal communication techniques (paralanguage: eye contact, hand gestures, posture, use of space, distance, silence, looks, and movement). The course also addresses audience adaptation, symbolism in personal brand communication, leadership and charisma in communication, and the rules of business etiquette, focusing on appropriate attitudes and gestures in professional settings.

028COMPI4 Accounting and Management Tools 2 Cr.

This elective course introduces future engineers to accounting organization, emphasizing a solid understanding and sufficient assimilation of basic principles of general accounting.

076CONDS5 Packaging and Wrapping 4 Cr.

This course aims to provide in-depth scientific knowledge about packaging and wrapping, to enable students to select optimal packaging for effective food product preservation.
Topics include: Packaging technology, theory of packaging (function and importance), types of packaging (plastic polymers, wood, textile, metal, glass, paper, multilayer packaging, active packaging, biodegradable packaging, intelligent packaging), physical properties of packaging (molecular weight, solubility, and polarity), mechanical properties of packaging (viscoelasticity, permeability, moisture transfer, gas exchange), four projects in the industry, food-packaging interaction, and finished product packaging technology.

028DESAS1 Computer-Aided Design (AutoCAD) 2 Cr.

This course introduces future agronomy and agri-food engineers to computer-aided design using AutoCAD software to design, create, and structure 2D drawing plans.
Topics include: Exploration of the AutoCAD environment, 2D drawing, drawing printing, and 3D drawing.

028DEONI2 Ethics in the Food Industry 2 Cr.

This course defines ethics and "food law," encompassing all norms directly or indirectly related to food, thus broadening the concept of food ethics.
Topics include the evolution of the food industry over time, animal-origin foods, new foods, functional foods, street foods, organic foods, and harmful substances in human and animal food: food additives, pesticide residues, veterinary drug residues, and contaminants. This course also covers rules for food preparation, processing, and sale.

028DEVCI2 Personal Development and Organizational Behavior 2 Cr.

This course aims to develop students' personality and management skills.
Topics include: The role and importance of the individual in the company, human behavior, motivation (self and others), empowerment and delegation, teamwork and conflict management, organizational behavior, leadership, supervision, and direction.

028DROTS1 Labor Law 2 Cr.

This course provides future engineers with essential legislative knowledge in labor law, enabling them to acquire the minimum level of understanding required for future roles as employee supervisors.

028ECOLI1 Fundamental Ecology 2 Cr.

This course covers the fundamental aspects of ecology as an environmental science. After assimilating these concepts, students will address the conservation of endangered species and the anthropogenic degradation of the environment, serving as a "showcase of ecology." By the end of this course, students will understand the fundamental concepts of general ecology, including the ecological niche concept, biotic and abiotic factors, interactions in biocenoses, energy flow, matter cycles, and all factors regulating ecosystem functioning.
Topics include general organization of the biosphere, structure of biocenoses and ecosystems, ecological factors, population ecology, and ecological monitoring.

028ECOAS1 Market Economics 2 Cr.

This course aims to familiarize students with the concept of the food system and all its actors. It covers the basic concepts of the supply chain approach, complemented by industrial and competitive analysis, and helps students understand the dynamics of food product consumption and markets, the various actors of the food system, and apply analytical tools to Lebanese agri-food supply chains.
Topics include: Definition of agri-food economics, history of food acquisition and types of food societies, application to Lebanese agri-food supply chains, systemic approach and food system, identification of food

system subsystems, theoretical approaches and application to the food system, agri-food supply chains, industrial analysis, competitive analysis applied to the agri-food sector, food product markets (consumption, demand, international trade), as well as food system actors (distribution, agri-food industry, agriculture, and agri-supply).

028ECOGI4 General Economics 2 Cr.

This course aims to acquire the necessary notions to understand the economic context in which business management problems arise.
Topics include: Basic definitions, the active population, economic circuit and main national accounting aggregates, consumption, public spending, main types of economic organization, and investment.

028PHY2I2 Electricity and Mechanics 2 Cr.

This course covers the presentation and explanation of basic knowledge, such as speed, acceleration, and force of a rigid system.
Topics include energy definition and explanation, work done by a moving body, cases of energy conservation and non-conservation, momentum theorem, and the study of free and damped harmonic oscillators with applications. Electricity topics include current circuits (resistance, capacitors, coils), (R, C), (R, L), (L, C), and (R, L, C) circuits in DC and AC, principles and laws, the study of electrical networks and active and passive dipoles, Kirchhoff's laws for circuit resolution, and the study of q(t), i(t), and u(t) in variable regimes. Additional topics cover electrostatic concepts, Laplace and Lorentz forces, Ohm's law, electrical networks, sinusoidal AC, Fresnel construction, diodes, and filters. Mechanics topics include kinematics and dynamics of a material point, work of a force, momentum, angular momentum, and free and damped harmonic oscillators.

076EMBAS3 Food Product Packaging 4 Cr.

This course provides knowledge on the role of packaging in preserving agri-food products through the study of material-product interactions.
Topics include: Economic and industrial approach to the packaging and conditioning sector, packaging production, container-content interactions, packaging study, packaging technology, and environmental considerations in packaging.

028ENNUI1 Digital Environment 4 Cr.

This course enables students to understand the hardware functioning of a computer, master the use of its operating system and some office software, and use oral presentation and communication techniques. Students will also learn to use the main Internet services and create static websites.

076SAPUS1 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 nutrition plays an important role, as well as the primary prevention of these issues through nutrition.

076EQIAS4 Equipment in Agro-Food Industries 2 Cr.

This course teaches students how to select, operate, and maintain equipment essential for various food industry techniques, focusing on optimizing production performance
Topics include: Introduction. Distribution of equipment according to different production areas. Equipment necessary for packaging (packaging and filling equipment). Specialized equipment for waste treatment (solid waste, liquid waste, gaseous waste). Equipment needed for cleaning and disinfection in Agro-food industries (clean-in-place principle, tanks, and CIP installations). Concepts of equipment efficiency. Overall Equipment Effectiveness (OEE).

076OUTIS5 Study of Industrial Tools 4 Cr.

This course critically examines industrial operations, encouraging students to question routine practices and propose improvements. It establishes foundational knowledge, particularly in preparing essential documents like schematics, which support other training modules.
Topics include: Description of industrial tools. Critiques and proposals.

076OPEUS5 Study of a Unit Operation 3 Cr.

This course covers both traditional and modern techniques for the analytical and industrial separation of food components, addressing core theories and practical applications. It also examines key industrial processes for food preservation.
Topics include: Classical filtration. Membrane separation. Distillation. Adsorption and ion exchange. Centrifugation and decantation. Preservation by cold. Preservation by heat. Preservation by solute enrichment. Preservation by ionizing radiation. Preservation by fermentation. Dehydration by drying.

076FERIS3 Industrial Fermentation 4 Cr.

This course enables future food industry engineers to recognize the different types of fermentation processes, their main characteristics, and various applications across sectors such as baking, brewing, winemaking, and dairy processing.
Topics include: Introduction. Cellular metabolism and regulation. Fermentation processes. Fermentation and biotechnology. Fermentation as a biological reaction. Technical realization and modeling of fermentation. Brewing.

076FLENS3 Fluids and Energy 2 Cr.

This course equips students with knowledge of physical data related to the production and absorption of energy by fluids used in the food industry, emphasizing their applications in unit operations and production lines.
Topics include: Energy bills. Sustainable management. Energy issues in food industries. Basics of fluid mechanics. Heat exchangers. Energy utilities in the food industry: operation, energy diagnosis (consumption balance), optimization.

017FDZBF2 Training in Muslim-Christian Dialogue (in Arabic) 2 Cr.

028GENEI3 General Genetics 2 Cr.

This course covers the basics of gene structure and expression regulation, the mechanisms of genetic trait transmission, and sources of genetic variability.
Topics include an introduction to genetics, cytogenetics, mitosis and the cell cycle, meiosis and genetic consequences, extensions of Mendelian genetics, genes and traits, genetic information carriers, transcription and regulation of gene expression, bacterial genetics, and genetic information modification.

028GÉOGI2 Geography 4 Cr.

This course addresses climatic elements influencing crop distribution and types, erosion agents leading to soil formation suitable for cultivation, correlations between crop yields and climate variations, surface landforms and their features, elevation amplitudes, and slope shapes through topographic maps (reading, analysis, and topographic profiling).
Topics include definitions, evolution, and objectives of geography, climate and agriculture, geomorphology (external dynamics of continents), and topography.

028GÉOLI2 Geology 2 Cr.

This course introduces the physical properties of the Earth's globe and the dynamic mechanisms occurring within it, mineral matter (minerals) and rocks, major geological phenomena, associated landscapes, and the consequences of groundwater and surface water circulation.
Topics include geothermal energy, magnetism, density, structure, seismic waves, Earth's age, volcanoes, earthquakes, crustal deformations, crystalline and amorphous minerals, igneous, sedimentary, and metamorphic rocks, paleontology (geological times and fossils), geological eras, relief modifications, fractures, folds, thrusts, and nappes. The course also encompasses structural analysis, including micro tectonics, structural styles, orogenic theories, stratigraphy, and paleogeography.

076GEPRS2 Production Management 2 Cr.

This course equips students with essential tools for effective industrial enterprise management, focusing on improving productivity, quality, and minimizing costs and delays.
Topics include: Stock and supply management. O.P.T. methods. Computer-Aided Production Management (GPAO) and MRP. J.A.T. Handling. TPM. 5S. SMED, etc. Quality control. SPC. Sampling. Mastery of industrial flows. Industrial diagnosis. Lean approach.

028GESTS1 Business Management 2 Cr.

This course introduces future engineers to the world of entrepreneurship by viewing the company as an open socio-economic system combining human, material, immaterial, and financial resources in an organized manner to provide innovative goods or services to clients, within an increasingly competitive environment with objectives of added value, profitability, and responsibility.
Topics include: The company and its environment as an open system. Types of businesses. Management. Leadership. Entrepreneurship and optimal problem-solving (e.g., in a production unit).

076GESES5 Management of Energy and Fluids 3 Cr.

This course introduces the principles of optimizing production energy efficiency and the safety of distribution systems in accordance with international standards. It also explores methods for achieving energy savings in the distribution and use of fluids.
Topics include: Safety instructions. Energy performance of an installation. "Learning" approach.

028HYDRS1 Hydrology 2 Cr.

This course covers the various elements of the water cycle and their influence on water availability for agricultural irrigation, as well as the processes of surface and groundwater flow in the watershed for effective water resource management.
Topics include: Surface hydrology. The watershed and its complexities. Natural environment, description and functioning. Infiltration and the infiltration process. Aquifers, types, and circulation. Water pollution from irrigation.

028AIAAS2 AI in Agriculture and Agro-Food 4 Cr.

This course addresses the issue of artificial intelligence in the agricultural and agro-food sectors. It focuses on applications that improve efficiency, quality, and sustainability in these production chains. It aims to introduce students to the application of existing AI techniques in the field, covering both theoretical concepts and practical implementations.
Additionally, the course examines the ethical considerations surrounding the integration of artificial intelligence (AI) in agricultural and agro-food systems.

076INCHS4 Meat and Fish Product Industry 2 Cr.

This course introduces the stages of the slaughtering and manufacturing processes for meat products, explains the different stages of the meat supply chain, defines the physiological components of meat and their influence on the final product quality, determines factors affecting the organoleptic quality of meat, and provides knowledge about various technologies applied in the production of meat products.
Topics include: Introduction. Transport and slaughter of animals. Meat composition. Meat maturation. Meat quality. Cooking. Freezing, quick freezing, and refrigeration of meat. Brief overview of the equipment used during meat product production. Principles of processed product manufacturing. Selection of meat for processed products. Raw materials other than meat. Processed products. Fresh products. Treated cooked products. Raw cooked products. Dried meat. Packaging. Risks of meat and charcuterie. Home meat handling. Latest scientific discoveries in the meat product industry. Practical work.

076INSPS4 Spirits Industry 2 Cr.

This course offers an in-depth study of production processes from agriculture to packaging, focusing on various types of spirit such as whisky, vodka, gin, rum, brandies (such as cognac), arak, and tequila/mezcal. It also covers legal and regulatory aspects of various controlled appellations in this field, and explores different supply

chains, global economics, and emerging trends in this sector. Students will have the opportunity to study major international groups and actors, as well as various categories of alcoholic beverages.

076INGAS3 Ingredients - Additives and Flavors 2 Cr.

This course aims to explore the uses, modes of action, and implementation of food additives, which are substances not classified as food themselves but added in small quantities during food preparation for specific technological or nutritional purposes. It will also address the important regulatory constraints associated with these additives.
Topics include: Definitions, classifications, and regulations of food additives and technological auxiliaries. Examples of use.

028INAGI1 Agricultural and Agro-Food Introduction 2 Cr.

This course introduces the characteristics of the agricultural world through exposure to different agronomy fields. Students will explore agricultural operations through surveys, discover agricultural and agro-food businesses through organized visits, and engage in practical experiences related to agriculture and food production.

028IAIII3 Agricultural Introduction II 2 Cr.

This course aims to introduce first-year students to basic agricultural techniques on a farm. Students will learn and practice basic plant production techniques (planting, sowing, weeding, pesticide spraying, applying fertilizers, operating a tractor, plowing, etc.) and animal production techniques (cleaning a barn and mechanically milking a cow). The final part of the course focuses on hygiene rules in a dairy and provides a brief description of the cheese production process.
Topics include: Applied cultural techniques in a farming plot. Techniques applied in a cattle farm (mechanical milking, etc.). Hygiene rules in a dairy during cheese production.

076DIAGS4 Innovation and Entrepreneurship - Food Product Manufacturing and Analysis 4 Cr.

This course focuses on understanding the principles and operational laws governing the processes involved in the creation of food products. It aims to enable students to extrapolate these concepts to an industrial setting by producing a product using pilot installations.
Topics include: Definition of a production diagram. Main physicochemical and biochemical mechanisms of transformation. Main biological and microbiological mechanisms applied to transformation. Stabilization through packaging. Identification of key points in the process. Project realization.

028INOVS2 Innovation and Entrepreneurship - Project Simulation 6 Cr.

This course provides future engineers with necessary tools to develop and manage sector-level development or innovation projects in agricultural or industrial practices at the entrepreneurial level.
Topics include engineering study methodology, project development from idea to startup, finding a project topic based on market trends, feasibility study (consumer study and financial overview), bibliographic study (research sources, research methodology, documentation, and bibliographic study exploitation), experimental study (experimental procedure planning, experimental setup, experimental plan, methods), writing, interpreting, and discussing results, prototype testing in the market (simulation in some cases), economic profitability study—calculation methodology (considered factors), presenting and interpreting results, and developing a business plan. Finally, students will deliver an oral presentation of their project findings.

076INSES5 Integration into the Company 4 Cr.

This course aims to integrate students into a company for 6 months during the 9th semester of their training (S5 of the Agro-food engineering cycle) to deepen their understanding of the responsibilities involved in ensuring industrial production. This company placement is divided into two equal parts: a part-time role in production and a part-time role at ESIA. The training is highly adaptable to the student's experience and the industrial context in which they find themselves. Students are responsible for building their knowledge, guided by their instructors, based on prior knowledge and personal experience during the 6 months in the company.
Areas such as production management, energy management, industrial mechanics, the impact of processes on products, business strategy, and human resource management may be addressed. Students will participate in

meetings with company managers and production heads, develop their work plans, and receive weekly follow-ups that include on-site visits, meetings at ESIAM, and correspondence via the internet. They will also describe the work environment, including the organization chart, product list, key figures, and more. Additionally, students will observe daily operations and complete monthly surprise letters, culminating in a presentation of their report.

028TLESI2 Talent Management and Leadership: Strategic Issues 2 Cr.

076CONTS5 Mastery of Industrial Processes 3 Cr.

This course provides the necessary information to control the influencing parameters of the process. The various stages include raising staff awareness and implementing control charts.
Topics include: General principles of statistical process control. Purpose of in-process control. Principle of in-process control. Comparison of I.T. to process dispersion. Control charts. Applications.

028MARKS1 Marketing 4 Cr.

This course aims to familiarize future engineers with the logic, vocabulary, principles, and basic practices of marketing, particularly in the agricultural and food sectors, through the analysis of recent cases. It seeks to enhance their understanding of marketing as a fundamental aspect of managerial decision-making and to enable them to conceptualize a commercially viable and differentiated start-up business.
Topics include: Comparison between marketing perspectives and traditional commercial perspectives (sales). Modern marketing perspectives (societal, individualized, experiential, relational, network-based). Marketing diagnosis (SWOT analysis). Company identity: vision, mission, and values. Forecasting as a fundamental step in marketing planning. Segmentation. Choosing target markets and positioning strategies. Consumers' roles. Purchasing process and influencing factors. Other strategic choices and their final arrangement in the marketing planning process to achieve specific objectives. The 7 Ps of marketing.

028MATHI1 General Mathematics 2 Cr.

This course aims to aid in building mental structure, understanding the relationship to daily life, and providing a foundation for algebra, computer science, statistics, data analysis, and experimentation. This foundation will be useful for learning other subjects during training and for planning experiments and making decisions in various active life domains. It serves as an essential prerequisite.
Topics include: Introduction. Study of sets. Algebraic calculations (concept). Real numbers (concept). Complex numbers

028PHY3I4 Fluid Mechanics 2 Cr.

This course highlights the importance of designing a structure with stability in mind, emphasizing the significance of proper sizing while reviewing the different materials used in engineering.
Topics include: Introduction to fluid mechanics. Fluid statics. Dynamics of ideal and incompressible fluids. Dynamics of viscous and incompressible fluids. Dynamics of compressible fluids.

028MDFES6 End of Study Project 30 Cr.

This course aims to introduce students to a pre-professional activity or scientific research through the discovery and testing of new techniques applicable in a company or farm. Students will write a thesis and defend their project before a panel of experts.
This project lasts for at least 6 months during which students must conduct experimental work, collect data, analyze it, and draw conclusions. It can focus on any specialty including crop production, animal production, economics, forestry, and more.

076MEUPS4 Milling and Baking (IAA) 2 Cr.

This course addresses the shortage of specialized personnel in this field in Lebanon and underscores the need for its inclusion in specialized university education. It explores the wheat-to-bread chain, which forms the foundation of processed foods, or agro-food. The course provides comprehensive training for agro-food engineers in baking by illustrating the entire process, from the grain of wheat to bread and pasta.

076MCRAS2 Food Microbiology 2 Cr.

This course aims to raise students' awareness of the importance of protecting consumer health through examples of food risks and crises. Additionally, it familiarizes students with microorganisms and their behavior in food products and during technological treatments, as well as the consequences of their development.
Topics include: Introduction to hygiene and food safety. Food contaminants: definition of biological, parasitic, chemical contaminants, and radionuclides. Microorganism behavior in food. Microorganisms in food. Toxi-infections and poisoning. Digestive toxico-infections. Digestive toxico-infections. Opportunistic pathogenic bacteria. Non-digestive toxico-infections. Molds and mycotoxins. Viral toxico-infections. Parasitic toxico-infections. Fighting food poisoning. Investigation of a foodborne illness outbreak. Study of the microflora of various foods (positive and negative).

028MICRI4 General Microbiology 4 Cr.

This course enables students to discover and understand the functioning of microorganisms (bacteria, viruses, etc.), their role in agriculture (soil-plant complex/phytopathology) as well as in food industry (fermented products/ food poisoning). It also seeks to deepen their knowledge of human immunology.
Topics include: General microbiology. Pathogenic power of bacteria. Viruses. Soil microbiology. Applications in medicine, agriculture, and Agro-food. Example: wastewater treatment. Practical work: microbial cultures (techniques for identifying and isolating specific bacteria).

076COCNS2 Nutrition and Communities 2 Cr.

This course addresses the nutrition and feeding of individuals, households, and groups forming a community. It examines the specific food consumption patterns of different community categories worldwide as well as all socioeconomic, cultural, and psychological factors influencing individuals' eating behavior within the community. It aims to understand the processes of developing evaluation, planning, and nutritional intervention programs that protect community public health, and presents basic methods of nutritional education for small groups.

028NUTRI4 Human Nutrition 4 Cr.

This course studies nutrition as the science examining the multiple relationships between humans and food, focusing on the biological processes surrounding nutrient use, food health, and nutritional needs.
Topics include: Foods and nutrients. Proteins, carbohydrates, and lipids. Dietary fibers. Vitamins. Water and minerals. Trace elements. Beverages (importance and nutritional composition). High-protein foods. Fruits and vegetables. Cereals and cereal products. Seasoning lipids. Food additives. Dietetics.

076OENLS4 Oenology 2 Cr.

This course on oenology covers the art and knowledge of wine, from cultivation to consumption, including harvesting, winemaking, aging, storage, and tasting.
Topics include: Knowledge of the vine. Raw materials and fermentation agents. Winemaking processes. Aging of wines. Preservation methods. Clarification processes. Stabilization processes. Wine diseases and faults.

076OPEUS3 Unit Operations 4 Cr.

This course focuses on traditional and modern techniques for the analytical and industrial separations of food constituents, covering both basic theory and practical application.
Topics include: Theory and physical principles governing processes (filtration, distillation, absorption, extraction, and membrane/chromatographic separations). Heat and mass transfer phenomena. Major traditional and advanced industrial processes applied for food preservation.

028OPROS2 Process Optimization and Operations Research 2 Cr.

This course equips engineers with a scientific knowledge base to effectively manage investments and regularly adjust their portfolio assets while considering risk and expected returns. It presents operations research methods and probability laws that guide managers in making informed and rational decisions in their business. These decisions involve evaluating and selecting the best option from multiple feasible solutions.

028PÉDOS1 Pedology 4 Cr.

This course aims to provide an understanding of soil, including its physical and chemical properties, mineral, organic, and biological components, texture and structure, porosity, water, air, and exchange capacity.
Topics include: Pedology. Pedogenesis. Soil classification.

028PHANI4 Animal Physiology 4 Cr.

This course enables students to understand the functioning of different organs and systems in the body.
Topics include: Animal development. Main functions of the animal organism: organization of physiological systems. Maintaining balance: homeostasis and biological regulation. Reproduction: the reproductive system. Breathing: the respiratory system. Nutrition: the digestive system. Internal transport: the cardiovascular system. Waste removal: the excretory system. Perception of the external world: the sensory system. Communication, analysis, and coordination: the nervous system. Movement: the skeletal and muscular systems. Practical work.

028PHVEI4 Plant Physiology 4 Cr.

This course enables students to understand the functioning of plants at two levels: nutrition and development, providing foundational knowledge necessary for understanding plant production courses taught during the engineering cycle.
Topics include: Nutrition. Growth and development. Laboratory practical work.

028PARMI2 Aromatic and Medicinal Plants 4 Cr.

This course introduces students to aromatic and medicinal plants, exploring their structure, characteristics, anatomy, and composition, as well as their applications in food, medicine, and pharmacology.
Topics include: Therapeutic plants. Application to Lebanese flora. Extraction of plant constituents. Essential oil plants. Characteristics of plant extracts. Preservation and use of extracts and their application in various fields. Standardization of medicinal plants.

076PLEXS4 Experimental Design (4 Cr.)

This course covers various tools for creating effective experimental design for a given situation (optimization of an industrial process, analytical method) and the statistical treatment 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. Taguchi method.

028POAGS2 Agricultural and Food Policies 2 Cr.

This course studies the agriculture situation in Lebanon, highlights its capabilities to address challenges, and proposes suitable solutions. It also fosters an expanded cosmopolitan culture, grounded in knowledge of significant events that have shaped the Lebanese landscape.
Topics include: Definition of an agricultural policy. Instruments of agricultural policy. Comparative analysis of major agricultural policies. Analysis of the situation of agriculture in Lebanon. Agricultural economics.

028PRSTI3 Probability and Statistics 4 Cr.

This unit contains the basic principles of descriptive statistics (measures of central tendency, measures of dispersion, skewness and kurtosis, graphical representations) as well as inferential statistics (hypothesis testing). Throughout this course, students will develop theoretical knowledge and practical skills to apply statistical concepts to real research situations in agronomy and agro-food sciences.
Topics include: Introduction. Descriptive statistics. Normal distribution. Sampling theory. Hypothesis testing: Chi-square test, t-test, ANOVA, correlation and linear regression. Non-parametric tests. Multivariate statistics.

028INF4S2 Programming 2 Cr.

This course aims to equip future agricultural and food industry engineers with essential computer software skills beneficial for their careers, focusing on Matlab to master fundamental concepts of algorithms and programming.

Topics include: Introduction to software. Tables. Queries. Forms. Reports. Exploring the Matlab 2009 environment. Calculations in Matlab. Graphics in Matlab.

076RHOAS4 Rheology of Food Products 2 Cr.

This course teaches students how to analyze and characterize the structure and behavior of food materials, which are key criterion of sensory quality (texture), through rheological techniques applicable in the food industry.
Topics include: Fundamental concepts of rheology. Behavior of food materials in deformation and flow.

028SCENI3 Environmental Sciences 2 Cr.

This course aims to familiarize students with all aspects related to the environment, beginning with its components, addressing the problems caused by human activity, and analyzing the causes and solutions to environmental issues.
Topics include: The environment and its history. Environmental sciences. Factors affecting the environment. Impacts. Environmental protection. Legislation and regulation.

028SECOS1 First Aid 2 Cr.

This course aims to introduce students to medical first aid for accidents or sudden illness and to teach them how to react effectively in urgent situations.
Topics include: The Red Cross and Red Crescent Movement. Structure of the Lebanese Red Cross and the role of each department. Steps of first aid. Assessing and managing a person with external bleeding. Assessing and managing the airways of an unconscious person. Managing airway obstruction in adults, children, or infants. Cardiopulmonary resuscitation in adults. Cardiopulmonary resuscitation in children and infants. Life-threatening conditions. Priorities in assessment and treatment. Normal vital signs in adults, children, and infants. Applying trunk stabilization. Applying a cervical collar and rapid assessment of a traumatized patient. Use of splints and improvised methods for extremities.

028STG2S1 Internship 2 2 Cr.

This internship enables students to apply the theories learned during their training in a practical setting, facilitating their familiarization with the professional world through placements at Lebanese or foreign research institutes or production companies. Key components include: Participation in research and laboratory analysis of agricultural products at a research institute LARI, IFAD, IRA) for one month in summer. Engagement in work undertaken within an agricultural enterprise for one month during the summer.

028STG3S3 Internship 3 2 Cr.

This internship enables students to apply the theories learned during their training in a practical setting, facilitating their familiarization with the professional world through placements at Lebanese or foreign research institutes or production companies. Key components include: Participation in research and laboratory analysis of agricultural products at a research institute LARI, IFAD, IRA) for one month in summer. Engagement in work undertaken within an agricultural enterprise for one month during the summer.

076SUPPS5 Supply Chain Management 4 Cr.

This course aims to familiarize students with various concepts related to supply chain management, enabling them to propose improvements that enhance company performance (reducing lead times, increasing profitability, improving customer satisfaction).
Topics include: Supply Chain performance and risk management. Introduction to supply chain and supply chain management. Demand management and order fulfillment. Purchasing and supply management. Logistics. Relationship management.

028QUALS2 Quality Systems in Business Management 4 Cr.

This course aims to familiarize students with quality concepts and quality systems in management, enabling them to understand the requirements of international standards and methods for implementing a system that meets ISO 9001:2008 standards within an organization.

Topics include: General introduction to quality management concepts. The 8 principles of quality management systems. Requirements of ISO 9001:2008. Complementarity of ISO 9001 with ISO 14001, OHSAS standards.

076DECHS5 Industrial Waste Management Techniques 4 Cr.

This course addresses theoretical principles as well as tangible examples of implementing industrial waste management techniques in Lebanon and worldwide.
Topics include: Definition of waste. Waste classification. Production chain. Just-in-time principles. Material balance equation. Waste treatment processes: fermentation (mechanization, composting, etc.), incineration, material recycling. ISO 14040/14044 standards.

028TEXPI1 Expression Techniques 4 Cr.

This course trains future agronomy and agro-food engineers at ESIAM in communication within academic and professional settings. It equips students with linguistic and methodological tools necessary to master the principles of oral and written communication in these environments and helps develop general skills to facilitate their engagement with specialized courses. Topics include: Techniques for rephrasing information. Bibliographic references. Reports and minutes. Writing. Oral presentations. Scientific communication. Professional insertion documents. Letters or emails of complaint or information.

076TELAS4 Dairy Technology 4 Cr.

This course aims to illustrate the implications of microorganisms in food processes, using a concrete example of cheese and other dairy product manufacturing.
Topics include: Milk biochemistry. Milk microbiology. Methods of milk preservation and treatment. Consumer milk technology. Frozen milk technology. Fermented product technology. Cheese technology. Fat product technology (butter, margarine, etc.).

028TECAS1 Food Technology 2 Cr.

This course aims to provide future engineers with general knowledge about food technology, including production, transformation, and preservation techniques, based on the chemical and physical behavior of nutrients.
Topics include: Introduction to food technology. Food preservation technology. Beer technology. Non-alcoholic beverage technology (juices). Vegetable oil technology. Sugar technology (sugar industry).

076TEHOS3 Olive Oil Technology 2 Cr.

This course facilitates the identification of olive oil as a natural and health-beneficial product. It also introduces various cultivation practices and the processes used to produce high-quality oil that meets consumer demands.
Topics include: Introduction. Effects of cultivation practices on oil quality. Olive oil extraction methods. Extraction of olive oil using solvents. Classification and storage of olive oil. Olive mill by-products and their environmental effects. Comparison between traditional methods and new technologies.

028PHY1I1 Thermodynamics 2 Cr.

This foundational course serves as a cornerstone for preparatory cycle students, providing a rigorous intellectual framework that cultivates scientific and logical reasoning. It significantly contributes to their cognitive development, shaping their growth as future engineers.
Topics include: Thermometry. Study of ideal gases. Calorimetry. Study of different types of transformations. The two principles of thermodynamics. Thermodynamic state functions: internal energy function U, enthalpy function H, entropy function S, free energy function F, free enthalpy function G. Physical equilibria.

028TOXII4 Foodborne Toxic Infections 2 Cr.

This course raises student's awareness about the risks of acute and chronic toxicities associated with exposure to foreign substances in food. It encompasses the analysis and comprehension of toxic effects, as well as the mechanisms of action of various residual pollutants and food additives that may be introduced, both intentionally and unintentionally, into the food supply.

Topics include: Food allergies and their causes. Concept of toxicity and contamination of food products. Different forms of food poisoning and factors influencing the body's response to a toxic substance. Toxicity evaluation. Chemical risk analysis. Voluntary and involuntary food allergies. Additives. Hypersensitivity.

076TREIS3 Water Treatment and Technologies 2 Cr.

This course provides necessary information on types of water and their sources in compliance with Lebanese and international standards. It covers the technological treatment of water concerning various physical, chemical, and microbiological contaminants, as well as the water control process from raw materials to finished products.
Topics include: Introduction and specification of water. Water treatment. Water control processes. Applications.

028PHY4I4 Heat Transfer 2 Cr.

This course explains the physical phenomena of heat and energy transfer in relation to agriculture and food industry.
Topics include: Energy sources and forms. Importance of renewable sources. Main definitions. Different modes of heat transfer. Heat transfer by conduction. Heat transfer by convection. Heat transfer by radiation. Applications.

076VISIS4 Company Visits 2 Cr.

This course gives students the opportunity to apply the theories learned during their training, and to become familiar with the professional world through guided tours of food industry companies related to their field of study.

028WOLES2 Women Leadership 2 Cr.

This course provides essential knowledge for female engineers navigating the marketplace. It aims to redefine contemporary success by increasing self-awareness and career clarity, aligning expectations for entering the job market, and understanding workplace gender dynamics to transform perceived limitations into advantages.
Topics include: emotional intelligence, gender gaps, positive psychology, and grit, highlighting their roles in personal development, teamwork, adaptability, and organizational leadership.

028ZOOLI2 Zoology (Organization of the Animal World) 4 Cr.

This course introduces students to the organization of the animal kingdom, emphasizing the relationship between classification and evolutionary progression, and identifying species that are useful or harmful to agriculture.
Topics include: The composition of the animal kingdom. Unicellular organisms or protozoa. Multicellular organisms or metazoan.

028ZOOTS1 Animal Farming and Products 4 Cr.

This course aims to introduce future engineers to the diversity of animal production and the technical specifics to each type of breeding, integrating modern farming technologies for sustainable production, and fostering the acquisition of precise zootechnical vocabulary. Each chapter covers the complete production system for various species—dairy and beef cattle, sheep, goats, and pigs—including breed selection, farm building organization, reproduction management, young stock rearing, feeding management, and veterinary intervention management.
Topics include: Vocabulary. General principles of zootechnics. General zootechnics. Special zootechnics.