BACHELOR OF ENGINEERING IN AGRICULTURAL 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 Agricultural Engineering trains students to:
- Act as mediators between science and agricultural practice
- Engage at all stages of agricultural production, from farm to fork
- Contribute to the development of competitive and sustainable agriculture at local, regional, and international levels
- Pursue advanced studies at prestigious universities.

PROGRAM LEARNING OUTCOMES (COMPETENCIES)

- Implement and/or operate competitive, sustainable agricultural production system
- Prevent, diagnose, and resolve issues in agricultural production units
- Manage agricultural entities with strong managerial and leadership skills
- Act as entrepreneurs in the agricultural field
- Develop research projects to improve production methods and product quality
- Implement agricultural development projects
- Communicate effectively with and train stakeholders in the agricultural 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

  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 (258 credits), Institution's Elective courses (34 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 Agri-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 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 (148 credits)
Voluntary and Citizen Action (2 Cr.). Agriculture and Biosystems (4 Cr.). Agrometeorology and Irrigation (4 Cr.). Animal Feeding - Principles of Ruminant Feeding (4 Cr.). English 4 (4 Cr.). Fruit Arboriculture (4 Cr.). Food Biochemistry (4 Cr.). Bioinformatics Statistics (2 Cr.). Plant Biotechnology (2 Cr.). Vegetable Crops (2 Cr.). Crop Diagnosis: Detection and Identification of Phytopathogenic Agents (4 Cr.). Market Economics (2 Cr.). Experimentation (4 Cr.). Business Management (2 Cr.). Hydrology (2 Cr.). Innovation and Entrepreneurship - Agricultural Experimentation (4 Cr.) Muslim-Christian Dialogue (2 Cr.). Innovation and Entrepreneurship - Project Simulation (6 Cr.). Weed Science (2 Cr.). Marketing (4 Cr.) Food Microbiology (2 Cr.). Quality Standards in Agriculture (2 Cr.). Plant Nutrition (4 Cr.). Process Optimization and Operations Research (2 Cr.). Animal Pathology (2 Cr.). Pedology (4 Cr.). Phytopharmacy and Assessment of Health and Environmental Risks (4 Cr.). Phytotechny (4 Cr.). Agricultural and Food Policies (2 Cr.). Sustainable Agricultural Practices (4 Cr.). ECO Project (4 Cr.). Plant Protection I (2 Cr.). Plant Protection II (4 Cr.). Internship 2 (2 Cr.). Internship 3 (2 Cr.). Alternative Pest Control Techniques (2 Cr.). Food Technology (2 Cr.). Plant Virology and Certification (2 Cr.). Animal farming and products (4 Cr.). End of Study Project (30 Cr.)

Institution's Elective Courses in the Engineering Cycle (28 credits)
28 credits to choose from the following list:
Smart Agriculture: Practices and Technology (4 Cr.). Animal Feeding - Ration Calculations (2 Cr.). Genetic Improvement of Herds (4 Cr.). Beekeeping (4 Cr.). Poultry Farming (2 Cr.). Communication Skills and Business Etiquette - FSZ (4 Cr.). Concepts of Landscape Design (4 Cr.). Soilless Cultivation (2 Cr.). AutoCAD (2 Cr.). Fisheries Science (2 Cr.). Ornamental Horticulture and Protected Cultivation (2 Cr.). AI in Agriculture and Agri-food (4 Cr.). Agricultural Machinery (2 Cr.). Plant Propagation and Breeding (2 Cr.). Olive Cultivation and Subtropical Arboriculture (4 Cr.). Aromatic and Medicinal Plants (4 Cr.). Programming (2 Cr.). GIS: Diagnostic and Forecasting Tool (4 Cr.). Agricultural Enterprise Strategy (4 Cr.). Quality Systems in Business Management (4 Cr.). Viticulture (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
028AGIRS3	Agrometeorology and Irrigation	4
028ALIMS3	Animal Feeding - Principles of Ruminant Feeding	4
028ARBFS3	Fruit Arboriculture	4
028BIOIS4	Bioinformatics Statistics	2
028CULLS3	Vegetable Crops	2
028ENTOS4	Plant Protection I	2
028STG3S3	Internship 3	2
	Institution's Elective	8
	Open Elective	2
Total		**30**

Semester 4

Code	Course Name	Credits
028BIOTS4	Plant Biotechnology	2
028EXPÉS4	Experimentation	4
028MALHS4	Weed Science	2
028FERTS3	Plant Nutrition	4
028PATHS4	Animal Pathology	2
028PHYPS4	Plant Protection II	4
028TPEXS4	Innovation and Entrepreneurship - Agricultural Experimentation	4
	Muslim-Christian Dialogue	2
	Institution's Elective	6
Total		**30**

Semester 5

Code	Course Name	Credits
028AGERS5	Agriculture and Biosystems	4
028DIAPS5	Crop Diagnosis: Detection and Identification of Phytopathogenic Agents	4
028NORMS5	Quality Standards in Agriculture (Global GAP, ISO 14000)	2
028PHYTS5	Phytopharmacy and Assessment of Health and Environmental Risks	4
028PRATS5	Sustainable Agricultural Practices	4
028PECOS5	ECO Project	4
028LUTTS5	Alternative Pest Control Techniques	2
028CERTS5	Plant Virology and Certification	2
	Institution's Elective	4
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.

028AGERS5 Agriculture and Biosystems 4 Cr.

This course offers students an overview of agriculture's impact on biosystems in relation to climate change and pollution. It introduces the application of conservation management using renewable energies and ecological restoration techniques for ecosystems degraded by intensive agriculture, presenting various means to conserve and protect biodiversity without compromising food security. Topics include climate change, agricultural practices and their impacts on biosystems, adaptation of agriculture to climate change, intensive livestock farming and agriculture: deforestation, overgrazing, erosion, fertilizers, and biodiversity conservation.

028AIPTS5 Smart Agriculture: Practices and Technologies 4 Cr.

This course introduces students to the latest practices and technologies in smart agriculture, highlighting benefits such as improved yields, increased efficiency, and reduced operating costs. Students will also explore Machine Learning and Deep Learning applications in automating labor-intensive activities such as weeding, spraying, and harvesting, which help cut labor costs and boost productivity. Additionally, the course examines the use of artificial intelligence to optimize purchasing decisions for farmers. Topics include agricultural data collection and analysis, water management, drones and video surveillance, Machine Learning, Deep Learning, and AI applications in agriculture.

028AGIRS3 Agrometeorology and Irrigation 4 Cr.

This course introduces methods for estimating and calculating water requirements of cultivated plants based on climatic conditions and plant physiology. It covers the planning of irrigation system (network construction, pressure loss calculations, etc.) and familiarizes students with modern irrigation techniques (drip irrigation, micro-sprinklers, etc.). Topics include plant water needs, irrigation system design, types of irrigation systems and equipment, soil water status, evapotranspiration, climatic water characteristics, climatic data analysis, and soil-water-plant relationships.

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

028RATIS3 Animal Feeding - Ration Calculations 4 Cr.

This course builds on "Animal Feeding, Principles of Ruminant Feeding". It covers ration calculations and practical application using INRAtion software.

028ALIMS3 Animal Feeding - Principles of Ruminant Feeding 2 Cr.

This course equips students with comprehensive knowledge on diverse feeding practices, available feeds, and approaches to rationalize animal rations, aligning nutrient supply with livestock needs. Topics include the evolution of livestock nutritional requirements, nutrient composition of primary feed sources, main feeding systems for livestock, zootechnical dimensions in reasoning feeding practices, and economic and environmental factors in feed management.

028AMGTS4 Genetic Improvement of Herds (in English) 4 Cr.

This course has a dual focus: to strengthen capacity in farm animal breeding and genetics, and to prepare students for advanced studies in this field.

028ANA1I1 Analysis 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 aims to introduce students to fundamental theoretical concepts of differential equations, while also explaining numerical methods for effectively solving them. It also covers integral calculus, including double integrals, triple integrals, curvilinear integrals, the Green-Riemann theorem, and operations on Laplace transformations and their applications. Topics include Laplace transformation, limited expansions, integral calculus, double integrals, numerical sequences, triple integrals, and differential equations.

028ANG4S2 English 4 4 Cr.

This course focuses on acquiring terminology specific to agriculture (soil, plant and animal production, agricultural issues) and the agri-food sector (food products, industrial processes, regulations). It aims to master the English language for oral and written communication in the field of specialty, facilitate group interaction, develop critical thinking in specialized language, and enable integration into the professional environment.
Course topics includes policy, schedule, contents, methods, attendance, evaluation, soils, plants, vegetables, fruits, organic vs. conventional agriculture, agribusiness, animals, vocabulary tests about agriculture, oral presentations on sustainable farming systems, debates, essays/letters, an introduction to the food industry, the production-to-consumption process, techniques for writing scientific reports and abstracts, food manufacture, food additives, sensory evaluation, and case studies (e.g., chocolate).

028APICS2 Beekeeping 4 Cr.

This course aims to familiarize 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 the bee colony, insect physiology, colony behavior, bee rearing, and the composition and quality of honey (royal jelly, wax).

028ARBFS3 Fruit Tree Arboriculture 4 Cr.

This course covers the modern techniques of fruit production and the specificities related to each fruit species, recommending technical solutions based on scenarios encountered in the field.
Topics include general fruit production principles, pome fruit species, and stone fruit species: almonds, hazelnuts, walnuts, figs, raspberries, and pomegranates.

028AVICS2 Poultry Farming 2 Cr.

This course aims to familiarize students with the specific techniques of poultry farming, focusing on the rearing of laying hens and broiler chickens.

028INF3I3 Databases (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 presentation, 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.

This course aims 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 basics of cellular respiration and photosynthesis.
Topics include an introduction to metabolism and bioenergetics, carbohydrate metabolism, the Krebs cycle, the 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 aims to provide students with various tools for computational and statistical analysis of data in agronomic and agri-food sciences, while fostering a critical mindset regarding data interpretation.
Topics include an 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.], analysis of variance with more than one factor, multivariate analyses [MANOVA, MANCOVA, repeated measures ANOVA, mixed model], and simple and multiple regression analysis.

028BIV1I1 Plant Biology 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 a general introduction, stems, leaves, roots, vegetative multiplication, flower organization in angiosperms, lifestyles of cormophytes, meristems and primary tissues, fruit, reproductive biology, and 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, and the transition to flowering plants: "pre-phanerogams" or "pre-spermatophytes."

028BIOTS4 Plant Biotechnology 2 Cr.

This course provides students with the biological, physiological, and biochemical foundations of plant biotechnologies, along with the technological aspects of various applications.
Topics include an introduction, genetic resource conservation, nutritional needs of in vitro cultured tissues, in vitro culture technology, applications of plant biotechnologies in horticulture, secondary metabolite production, physiological phenomena related to in vitro culture, and applications of plant biotechnologies in plant improvement.

028BOTAI2 Botany (Plant Systematics) 4 Cr.

Students will learn to classify flora, recognize the main plant families in situ, and establish a herbarium according to standards.
Topics include an introduction, major divisions, principles of taxonomy and plant evolution, division of spermatophytes (seed plants), and sub-division 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 the atom, periodic classification of elements, the Lewis model of molecules and ions, atom association, resonance, molecular polarity, 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.

028CONPS4 Concepts of Landscape Design 4 Cr.

This course teaches students the techniques of architectural design for natural landscapes and gardens.
Topics include the history of landscaping, development of graphic language, basic design elements and principles, plant composition, and project work.

028CULHS4 Soilless Cultures 2 Cr.

This course aims to familiarize students with plant production methods using different soil substitutes such as ceramics, water, and perlite, representing a modern agricultural trend that liberates cultivation from fragile and damaging mediums.
Topics include the evolution of soilless cultures from research to development, the current state of soilless production, various soilless culture systems, basics of mineral nutrition physiology, substrates, nutrient solutions, and nutrition control and regulation.

028CULLS3 Vegetable Cultivation 2 Cr.

This course covers all the necessary practical information for growing vegetables in Lebanon, offering both general and applied knowledge on cultural and agricultural techniques, including plowing, seeds, irrigation, yield, varieties and types, and physiological disorders of vegetables grown in Lebanon.
Topics include an introduction and generalities, as well as cultivation of solanaceae, cucurbitaceae, asteraceae, cruciferae, umbelliferae, and liliaceae.

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

This course introduces future agronomic and agri-food engineers to computer-aided design using Autocad software to design, create, and structure 2D drawings.
Topics include exploration of the AutoCAD environment, 2D drawing, printing a drawing, and 3D drawing.

028DEONI2 Ethics in the Agri-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 enterprise, human behavior, motivation (self and others), empowerment and delegation, teamwork and conflict management, organizational behavior, leadership, supervision, and direction.

028DIAPS5 Cultural Diagnosis: Detection and Identification of Phytopathogens 4 Cr.

This course complements the "Phytopathology and Plant Virology" course by teaching differentiation and analysis of symptoms and precise identification of the causative agents for effective crop management.
Topics include biological methods, serological methods, and molecular methods.

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.
Topics include the definition of agri-food economics, history of food acquisition and typology of food societies, application to Lebanese agri-food chains, systemic approach and food system presentation, food system subsystems identification, 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 for understanding the economic context in which business management problems arise.
Topics include basic definitions, the active population, economic circuit and main aggregates of national accounting, 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.

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 problems where nutrition plays a significant role and the primary prevention of these problems through nutrition.
Topics include introduction to epidemiological methods, preventive nutrition and public health, prevention and specific dietary factors, genetically modified organisms, new food-related diseases, obesity prevention strategy, and global food insecurity.

028EXPÉS4 Experimentation 4 Cr.

This course covers various tools for creating an experimental design for agronomy research and the statistical treatment of derived data. It aims to enable students to establish experimental designs and statistical data treatment, recognizing the importance of experimental designs in agronomy.
Topics include introduction to experimental designs, CRBD designs, CL and CGL designs, crossover designs, and split-plot designs.

017FDZBF2 Training in Muslim-Christian Dialogue (in Arabic) 4 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.

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).

028FOREI4 Forest Management 2 Cr.

This course aims to introduce students to Lebanese forests and their importance for the environment and national economy, teaching them about forest conservation and management.
Topics include general forestry and forests in Lebanon.

028HALIS4 Fisheries 2 Cr.

This course aims to familiarize students with the specific techniques related to fish and seafood farming.

028HORTS4 Ornamental Horticulture and Protected Cultures 2 Cr.

This course introduces students to flowering and ornamental species, cultivation techniques for their production, greenhouse planning tools, and the design of plant production under conditions that are not suitable for plant growth.
Topics include the global economy of ornamental plants, recognition of ornamental plants, cultivation techniques, standardization, and technical routes for a nursery.

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 Agri-Food 4 Cr.

This course addresses the issue of artificial intelligence in the agricultural and agri-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 agri-food systems.

028INAGI1	**Agricultural and Agri-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.

028TPEXS4	**Innovation and Entrepreneurship - Agricultural Experimentation**	**4 Cr.**

This practical course aims to apply field experimental campaigns, allowing future engineers to acquire the necessary autonomy in experimentation and data analysis.
Topics include designing the experimental plan, sowing test varieties (winter crops), crop monitoring, harvesting and experimental measurements (data collection), statistical data analysis and conclusions, and presenting the final report with synthetic results and conclusions.

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.

028TLESI2	**Talent Management and Leadership: Strategic Issue**	**2 Cr.**

028MACHS3	**Agricultural Machinery**	**2 Cr.**

This course familiarizes students with the various machines used in agriculture and animal husbandry.

028MALHS4	**Weed Science**	**2 Cr.**

This course aims to familiarize students with the most common weeds in Lebanese crops to enhance their ability to control their spread and minimize damage. Topics include: Definitions. Main weeds encountered in various crops and their associated damage. Methods for weed control. Field visits and identification of weed seedlings and mature plants

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.

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 for consumers. Food contaminants: definition of biological, parasitic, chemical contaminants, and radionuclides. Behavior of microorganisms in food. Microorganisms in food. Foodborne infections and intoxications. Digestive manifestations of foodborne infections. Opportunistic pathogenic bacteria. Non-digestive manifestations of foodborne infections. Molds and mycotoxins. Viral foodborne infections. Parasitic foodborne infections. Fighting food intoxications. Investigation of a foodborne disease outbreak. Study of the microflora of different foods (positive and negative).

028MICRI4 General Microbiology 4 Cr.

This course enables students to discover and understand the functioning of microorganisms (bacteria, viruses, etc.), identify their roles in agriculture (soil-plant complex / plant pathology) and the agro-food industry (fermented products / food intoxications), and deepen their knowledge in human immunology.
Topics include: General microbiology. Pathogenicity of bacteria. Viruses. Soil microbiology. Applications in medicine, agriculture, and agro-food. Example: wastewater treatment. Laboratory work: microbial cultures (techniques for identification and isolation of specific bacteria).

028MULTS3 Plant Propagation and Breeding 2 Cr.

Building on the contributions of biotechnology and molecular biology to plant species' reproduction modes as well as to the characterization and conservation of genetic resources, this course provides knowledge about selection methods and understanding the resources, issues, and perspectives to assess the importance of advances in varietal creation.
Topics include: Photogenetic resources. Basic principles of breeding. Reproduction modes and control of reproduction. Elements of quantitative and qualitative genetics. Utilization of genetic diversity and biotechnology. Selection strategies and varietal creation. Enhancing selection in allogamous species. Selection methods used according to existing or induced genetic variability. Enhancing selection in vegetative reproducing species. Utilization of molecular biology and genotypic selection.

028NORMS5 Quality Standards in Agriculture 2 Cr.

This course covers the application of the Global Gap quality system according to the global requirements imposed on agricultural and horticultural businesses concerning food safety, sustainability, and quality.
Topics include: Introduction. How hazards find their way to produce. Global Gap control points. Record keeping and internal self-assessment. Site selection & land preparation. Seed, crop selection and seedling production. Pesticide application. Integrated pest management. Water resources & irrigation practices. Crop, pests, and disease. Maintaining soil fertility. Workers welfare. Field hygiene. Recommended good harvesting procedure. Traceability. Pollution. Complaints.

028FERTS3 Plant Nutrition 4 Cr.

This course covers the physiological and biochemical roles of mineral elements in plants, the physiology of nutrient uptake in cultivated plants, and their needs for macro and micronutrient fertilizers. The course also distinguishes between different types of mineral and organic fertilizers available on the Lebanese market and the technological processes for their distribution and application to growing media such as soil or nutrient solutions.
Topics include: Plant and soil. Amendments and fertilizers. Crop needs. Fertilization practices. Use of a computer program for "fertilizer calculation."

076COCNS2 Nutrition and Communities 2 Cr.

This course addresses the nutrition and feeding of individuals, households, and groups within a community. It examines the specific food consumption patterns of different community categories worldwide, as well as the socio-economic, cultural, and psychological factors influencing individuals' eating behaviors. 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). Protein-rich foods. Fruits and vegetables. Cereals and cereal products. Culinary fats. Food additives. Dietetics.

028ARBSS4 Olive and Subtropical Fruit Tree Cultivation 4 Cr.

This course covers the fruit species cultivated in Lebanon throughout its ancient history (olive trees, citrus fruits, and bananas) and familiarizes students with the new subtropical species flourishing in southern Lebanon (avocados, kiwis, etc.). The course presents fundamental principles and modern procedures for cultivating each of these species, from planting to fruit marketing. By the end of this course, students will be capable of managing and caring for an orchard or family garden featuring olive trees, citrus fruits, bananas, avocados, kiwis, medlar trees, and cherimoyas.
Topics include: Main theoretical and practical foundations of care for Mediterranean and subtropical fruit trees. Pruning and management of an orchard or family garden with Mediterranean and subtropical fruit trees. General introduction to arboriculture (olive trees, citrus fruits, bananas, avocados, kiwis, cherimoyas, medlar trees).

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.

028PATHS4 Animal Pathology 2 Cr.

This course familiarizes students with important diseases in livestock and their technical-economic impacts. It raises awareness of epidemiological surveillance systems and key aspects of health regulations, focusing on the transmission and prevention of contagious and zoonotic diseases that pose public health risks or result in serious economic challenges.
Topics include: General veterinary medicine. Infection. Veterinary health legislation. Antimicrobial agents. Rodent control. Major infectious diseases of domestic animals. Control methods.

028PÉDOS1 Soil Science 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: Soil science. Soil formation. 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.

028PHYTS5 Phyto Pharmacy and Assessment of Health and Environmental Risks 4 Cr.

This course aims to raise students' awareness of the metabolism of phytosanitary products and their fate in the environment, as well as their optimal use and handling.
Topics include: Characteristics of phytosanitary products. Formulations and compatibilities of pesticides. Treatment programs. Calculation of the biological efficacy of insecticides. Risks of resistance development in target organisms and resistance management. National and international legislative framework for the accreditation and use of pesticides.

028PHYTS2 Phytotechnics 4 Cr.

This course focuses on the common principles applicable to all plant production and their application to different cereal crops. It integrates diverse knowledge, equipping future agronomists and agro-food engineers with decision-making skills for various types of plant production while fostering an understanding of research or professional issues in their full complexity.
Topics include: Introduction. General phytotechnics. Special phytotechnics.

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 in various fields. Standardization or normalization of medicinal plants.

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.

028PRATS5 Sustainable Agricultural Practices 4 Cr.

This course covers aspects related to crop intensification and planning through sustainable agricultural concepts. It also aims to convey the benefits of new techniques and their long-term application, providing students with essential information to grasp the importance of organic farming, its agronomic principles, and its various environmental, social, and economic aspects.
Topics include: Introduction. Livestock management. Soil management. Sustainable development. Review of cycles + interpretation. Crop management. Water management.

028PRSTI3 Probabilities and Statistics 4 Cr.

This course covers the basic principles of descriptive statistics (measures of central tendency, dispersion, skewness, kurtosis, graphical representations) and inferential statistics (hypothesis testing).
Throughout the course, students will develop theoretical knowledge and practical skills to apply statistical concepts to real-world research situations in agronomy and agro-food sciences.
Topics include: Introduction. Descriptive statistics. Normal distribution. Sampling theory. Hypothesis tests: Chi-squared 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: Presentation of the software. Tables. Queries. Forms. Reports. Exploration of the Matlab environment. Calculation in Matlab. Graphics in Matlab.

028PECOS5 ECO Project 4 Cr.

This course aims to apply the knowledge gained in the "Sustainable Agriculture" specialization.
The project topic should be inspired by the courses attended, which may include renewable energy, biological control techniques, agricultural waste reduction mechanisms or valorization of these wastes, and sustainable agricultural practices.

028ENTOS4 Plant Protection I 2 Cr.

This course is divided into two parts: the first covers the morphology, anatomy, and physiology of insects, while the second part provides essential entomological knowledge relevant to agronomy, focusing on pest and beneficial insects.
Topics include: Importance and diversity of insects. General characteristics of insects. Post-embryonic development: molts and metamorphoses. Types of larvae and nymphs. Insect classification. Major mites and insects harmful to fruit tree cultivation. Major mites and insects harmful to protected crops. Major mites and insects harmful to large crops. Major mites and insects harmful to stored goods, Major mites and insects harmful to forestry. Methods of controlling harmful insects in crops.

028PHYPS4 Plant Protection II 4 Cr.

This course aims to provide students with the theoretical and practical knowledge necessary for plant pathology. Topics include: Introduction to plant pathology. General overview of phytopathogenic fungi. Major fungal diseases of grapevines and olive trees. Major fungal diseases of fruit trees. Major fungal diseases of solanaceous plants. Major fungal diseases of cucurbits. Major fungal diseases of large crops. General overview of phytopathogenic bacteria. Major bacterial diseases in fruit crops. Major bacterial diseases of plants. This course also includes practical work.

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 basic 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 in first aid. Assessing and managing a person with external bleeding. Assessing and managing the airway of an unconscious person. Managing airway obstruction in adults, children, and infants. Cardiopulmonary resuscitation (CPR) for adults. Cardiopulmonary resuscitation (CPR) for children and infants. Life-threatening cases. Priorities during assessment and treatment. Normal vital signs for 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.

028SIGDS5 GIS: Diagnostic and Forecasting Tool 4 Cr.

This course explores the modernization of the agricultural sector, emphasizing improved management techniques and enhanced yields through computerization, particularly with the development of Geographic Information Systems (GIS).
Topics include: Introduction. General principles. Attribute tables. Session Edit. Cartography. Digital terrain model. Positioning. Applications. Conclusion.

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.

028STRAS5 Agricultural Exploitation Strategy 4 Cr.

This course aims to familiarize students with the concepts of business strategy, focusing on understanding the approach and foundations of strategic thinking, mastering strategic analysis, and identifying the main tools for strategic diagnosis and different strategic orientations. Topics include: Strategic choices of the company.

Conclusion and finalization of the project. Internal diagnosis of the company. Introduction and definition of strategy. Generalities on business strategy: strategic decisions, strategy elements, strategic analysis tools, strategy dimensions. Collection of information on the company's strategy: data search and interviews with company leaders where the student is interning. External diagnosis of the company's competitive environment. Macro-environment-PESTEL. Agricultural sector. Industrial analysis. Competitive analysis. SWOT analysis: opportunities and threats, strengths and weaknesses.

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, OSHAS 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 reformulating information. Bibliographic references. Reports and minutes. Oral presentations. Scientific communication. Professional insertion documents. Letters or emails of complaint or information.

028LUTTS5 Alternative Pest Control Techniques 2 Cr.

This course enhances the training of agronomy students specializing in plant protection by orienting them towards environmentally friendly and health-conscious pest control methods and economically viable solutions. This course broadens future agronomists' perspectives and strengthens their training to meet labor market demands, especially as developed countries increasingly shift towards ecological and natural agricultural systems.

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 beverages technology - juices. Vegetable oils technology. Sugar technology (sugar sector).

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 U, enthalpy H, entropy S, free energy F, free enthalpy 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 additives. Hypersensitivity.

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.

028CERTS5 Plant Virology and Certification 2 Cr.

This course complements the "Plant Pathology and Plant Virology" course by deepening students' understanding of virus and viroid pathogenesis, observing and analyzing symptoms, and accurately identifying the agents involved to implement the most appropriate cultivation practices.
Topics include: Principles of plant virology "generalities". Epidemiology. Control measures. Main viral diseases. Certification.

028VITIS3 Viticulture 2 Cr.

This course covers modern viticulture techniques for table grapes and wine grapes, focusing on the specifics of each sector in Lebanon. Topics include: Study of the viticulture and viniculture sector in Lebanon. Establishment of a vineyard. Grape varieties and rootstocks. Vine maintenance elements.

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.