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 (5 semesters)

OBJECTIVES

The Bachelor of Engineering in Agricultural Engineering enables students to:

- Conduct research and develop products (fertilizers, biopesticides, etc.) for the agricultural sector.
- Manage agricultural companies, enterprises, and farms while optimizing production.
- Implement quality systems in agricultural operations to ensure production that complies with international standards for quality and consumer health.
- Pursue higher education at internationally renowned universities.

PROGRAM LEARNING OUTCOMES (COMPETENCIES)

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

PROGRAM REQUIREMENTS

300 credits: Required courses (266 credits), Institution's elective courses (26 credits), Open elective courses (8 credits), and USJ General Education Program (34 credits, may be part of the above categories).
Preparatory Cycle in Agricultural Engineering
120 credits: Required courses (110 credits), Institution's elective courses (6 credits), Open elective courses (4 credits)

Fundamental Courses (116 Cr.)

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

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

Open Elective Courses (4 Cr.)

Bachelor of Engineering in Agricultural Engineering
180 credits: Required courses (156 credits), Institution's elective courses (20 credits), Open elective courses (4 credits)

Fundamental Courses (176 Cr.)

Required Courses (156 Cr.)
Market Economics (2 Cr.); Advanced Python (2 Cr.); Business Management (2 Cr.); Hydrology and Agrometeorology (4 Cr.); Introduction to Marketing (2 Cr.); Pedology (4 Cr.); Internship 2 (2 Cr.); Animal Physiology (4 Cr.); Plant Physiology (4 Cr.); Fertilization: Principles (2 Cr.); Animal Husbandry and Animal Products (4 Cr.); English 4 (4 Cr.); Waste and Byproduct Management (2 Cr.); AI Ethics in Agriculture and Agri-food (2 Cr.); Introduction to Agricultural Entomology (2 Cr.); Introduction to Phytopathology (2 Cr.); Operations Research (2 Cr.); Field Crops (2 Cr.); Agricultural Machinery (2 Cr.); Agricultural and Food Policies (2 Cr.); Irrigation (4 Cr.); Animal Feeding – Principles of Ruminant Nutrition (4 Cr.); Arboriculture of Rosaceae (2 Cr.); Applied Statistics (2 Cr.); Vegetable Crops (4 Cr.); Internship 3 (2 Cr.); Applied Entomology (2 Cr.); IoT (Internet of Things) (2 Cr.); Applied Phytopathology (2 Cr.); Experimentation (2 Cr.); Subtropical Arboriculture (2 Cr.); Poultry Farming (2 Cr.); Management of Auxiliary Flora (2 Cr.); Biotechnologies and Plant Variety Protection (2 Cr.); Machine Learning (2 Cr.); Animal Pathology (2 Cr.); Phytopharmacy (4 Cr.); Design and Management of an Agricultural Project (4 Cr.); Viticulture (2 Cr.); Agrobiodiversity and Natural Areas (4 Cr.); Agriculture Certification Schemes (4 Cr.); Science, Engineering, and Environmental Sustainability (4 Cr.); Supply Chain Management and Logistics (4 Cr.); Post-Harvest Technologies for Agricultural Products (2 Cr.); Global Marketing and Digital Communication (2 Cr.); Managerial Finance for Agribusiness (4 Cr.); Corporate Social Responsibility and Business Ethics (2 Cr.); Conflict Management, Stress Management (2 Cr.) Final Year Project (30 Cr.); Management of Agricultural and Industrial Waste and Byproducts (2 Cr.).

Institution's Elective Courses (20 Cr.), to be chosen from the list below:
Beekeeping and Honey (4 Cr.); Nutrition and Communities (2 Cr.); AutoCAD and Photoshop (2 Cr.); Aromatic and Medicinal Plants (2 Cr.); Animal Nutrition – Ration Calculations (2 Cr.); Plant Genetic Improvement (2 Cr.); Nurseries (2 Cr.); Livestock Genetic Improvement (2 Cr.); Fisheries (2 Cr.); Ornamental Horticulture and Protected Crops (2 Cr.); Soilless Cultivation (2 Cr.); Landscape Design Concepts (2 Cr.); GIS: Diagnostic and Forecasting Tool (2 Cr.); Project Management Methodology (2 Cr.); Seminar (2 Cr.); Natural Resource Sanitation (2 Cr.); Personal Development and Organizational Behavior (2 Cr.).

Open Elective Courses (4 Cr.)

USJ General Education Program (34 Cr.)

Code	Course Name	Credits
	ENGLISH OR OTHER LANGUAGE	**4**
028ANG4S2	English 4	4
	ARABIC	**4**
	Arabic Language and Culture	**2**
435LALML2	Arabic Language and Media	2
	Other Course Taught in Arabic	**2**
028INAGI2	Agricultural and Agri-food Initiation I	2

	HUMANITIES	**8**
064VALEL1	USJ Values in Daily Life	2
	Ethics	**2**
076CRBES5	Corporate Social Responsibility and Business Ethics	2
	Civic Engagement and Citizenship	**2**
028VCACS3	Volunteer and Citizen Action	2
	Other Humanities Course	**2**
076GCGSS5	Conflict Management, Stress Management	2
	SOCIAL SCIENCES	**6**
	Professional Integration and/or Entrepreneurship	**2**
028CCPBI3	Career Coaching and Personal Branding	2
	Other Social Sciences Course	**4**
028CGPAS4	Design and Management of an Agricultural Project	4
	QUANTITATIVE TECHNIQUES	**8**
028PRSTI3	Probability and Statistics	4
028ENNUI1	Digital Environment	4
	COMMUNICATION TECHNIQUES	**4**
028TEXPI1	Expression Techniques in Digital Era	4

SUGGESTED STUDY PLAN

Semester 1

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

Semester 2

Code	Course Name	Credits
	Required Courses - Preparatory in Agricultural Engineering	
028ALGEI2	Algebra for Engineers	4
028CHISI2	Solution Chemistry	4
028BIGEI2	General Biology	4
028DEVCI2	Personal Development and Organizational Behavior	2
028ECOLI1	Fundamental Ecology	2
028PHY2I2	Electricity and Mechanics	2
028GÉOLI2	Geology	2
028INAGI2	Agricultural and Agri-food Initiation I	2
028DRTLI2	Lebanese Labor Law	2
028SCENI2	Environmental Sciences	2
028COMPI4	Accounting and Management Tools	2
	Institution's Elective Course	2
	Total	**30**

Semester 3

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

Semester 4

Code	Course Name	Credits
	Required Courses - Preparatory in Agricultural Engineering	
028BCHMI4	Metabolic Biochemistry	2
028CHIAI4	Analytical Chemistry	4
028ECOGI4	General Economics	2
028MICRI4	General Microbiology	4
028NUTRI4	Human Nutrition	4

028PHY4I4	Heat Transfer	2
435LALML2	Arabic Language and Media	2
028BOTAI4	Botany	4
028INPYI4	Introduction to Python	2
028EPBMI4	Engineering Properties of Biological Materials	2
	Institution's Elective Course	2
	Total	**30**

Semester 5

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agricultural Engineering	
076ECOAS1	Market Economics	2
076ADPYS1	Advanced Python	2
028GESTS1	Business Management	2
028HYAGS1	Hydrology and Agrometeorology	4
076INM1S1	Introduction to Marketing	2
028PEDOS1	Pedology	2
028STG2S1	Internship 2	2
028PHANS1	Animal Physiology	4
028PHVEI4	Plant Physiology	4
028FEPIS1	Fertilization Principles	2
076STAPS1	Applied Statistics	2
	Open Elective Course	2
	Total	**30**

Semester 6

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agricultural Engineering	
028ZOOTS2	Animal Science and Animal Products	4
028ANG4S2	English 4	4
028DGPAS2	Management of Agricultural and Industrial Waste and Byproducts	2
028AIAAS2	AI Ethics in Agriculture and Agri-Food	2
028INEAS2	Introduction to Agricultural Entomology	2
028INPHS2	Introduction to Phytopathology	2
076REOPS2	Operational Research	2
028GRCUS2	Field Crops	2
028MAAGS2	Agricultural Machinery	2
028POAGS2	Agricultural and Food Policies	2
	Institution's Elective Course	6
	Total	**30**

Semester 7

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agricultural Engineering	
028AGIRS3	Irrigation	4
028ALIMS3	Animal Nutrition – Principles of Ruminant Nutrition	4
028ARBRS3	Arboriculture of Rosaceae	2
076BIPVS3	Biotechnologies and Plant Variety Protection	2
028CULMS3	Vegetable Crops	4
028STG3S3	Internship 3	2
028ENAPS3	Applied Entomology	2
028IOTHS3	IoT (Internet of Things)	2
028PHAPS3	Applied Phytopathology	2
	Institution's Elective Course	4
	Open Elective Course	2
	Total	**30**

Semester 8

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agricultural Engineering	
028EXPES4	Experimentation	2
028ARSUS4	Subtropical Arboriculture	2
028AVICS4	Poultry Farming	2
028GEFAS4	Management of Auxiliary Flora	2
026MALES4	Machine Learning	2
028PATHS4	Animal Pathology	2
028PHYPS4	Phytopharmacy	4
028CGPAS4	Design and Management of an Agricultural Project	4
028VITIS4	Viticulture	2
	Institution's Elective Course	8
	Total	**30**

Semester 9

Code	Course Name	Credits
	Required Courses - Bachelor of Engineering in Agricultural Engineering	
028ABENS5	Agrobiodiversity and Natural Areas	4
028AGCSS5	Agriculture Certification Schemes	4
076SGDES5	Science, Engineering, and Environmental Sustainability	4
076MSCAS5	Supply Chain Management and Logistics	4
028TPRAS5	Post-Harvest Technologies for Agricultural Products	2
076GMDCS5	Global Marketing and Digital Communication	2
076MFABS5	Managerial Finance for Agribusiness	4

076CRBES5	Corporate Social Responsibility and Business Ethics	2
076GCGSS5	Conflict Management, Stress Management	2
	Institution's Elective Course	2
	Total	**30**

Semester 10

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

COURSE DESCRIPTION

076ADPYS1 Advanced Python 2 Cr.

This course deepens students' mastery of Python by exploring advanced concepts and powerful tools used in software development and data analysis. Topics include advanced data structures, high-level functions (lambda, map, filter), in-depth object-oriented programming, decorators, generators, exception handling, as well as common libraries (NumPy, pandas, matplotlib), asynchronous programming, file handling, and best coding practices. Practical projects and case studies enhance programming skills for complex applications.

028AGCSS5 Agriculture Certification Schemes 4 Cr.

This course offers an in-depth overview of agricultural certification schemes, focusing on standards, implementation processes, and impacts on production systems. Students will study certifications such as organic, Fair Trade, GlobalGAP, and Rainforest Alliance, covering criteria related to sustainability, social responsibility, food safety, and product quality. Through case studies, students will assess their influence on market access, consumer trust, and ethical supply chains.

028ABENS5 Agrobiodiversity and Natural Areas 4 Cr.

The course explores biodiversity in agricultural and natural systems, emphasizing their role in ecosystem resilience and sustainable farming practices. Students will learn about agrobiodiversity, species interactions, soil microorganisms, and habitat management near farms. Topics include conservation, genetic resource protection, and integrating natural spaces into agricultural strategies. Case studies highlight biodiversity-enhancing practices.

028ALGEI2 Algebra for Engineers 4 Cr.

This course establishes a solid foundation in essential algebra, matrix calculus, solving linear systems, and the reduction of endomorphisms. Students will develop the skills needed for applications in computer science, hydraulics, heat transfer, statistics, and data analysis. Topics include the reduction of endomorphisms and square matrices, vector spaces and linear applications, algebraic structures, matrices and matrix calculus, determinants, and linear systems.

028RATIS3 Animal Nutrition – Ration Calculations 2 Cr.

This course focuses on formulating and adjusting feed rations based on animal species, age, physiological stage (growth, lactation, reproduction), and production objectives. Students will assess feed nutritional value (energy, protein, minerals, vitamins), use composition tables, and apply manual and computerized methods for ration balancing. Economic and zootechnical optimization and local resource use are emphasized.

028ALIMS3 Animal Nutrition – Principles of Ruminant Nutrition 4 Cr.

This course introduces the fundamentals of feeding ruminants, focusing on nutritional needs, types of feed (forage, concentrates, supplements), and the specific digestive systems of ruminants. Students will learn to formulate

balanced rations based on species (cattle, sheep, goats), physiological stages (growth, lactation, fattening), and production goals. It also covers impacts on health, productivity, welfare, and the environment.

028AMGPS3 Plant Genetic Improvement 2 Cr.

This course covers principles and methods for genetically improving crop varieties for higher performance, disease resistance, stress tolerance, and agroecological adaptation. Topics include traditional breeding, crossbreeding, plant biotechnology, genetic engineering, and marker-assisted selection. Ethical, economic, and environmental concerns, and the role of breeding in food security and sustainability are also addressed.

028AMGTS4 Livestock Genetic Improvement 2 Cr.

This course examines genetic improvement methods in livestock populations. Topics include quantitative genetics, breeder selection, crossbreeding, genomics, and marker-assisted selection. Students analyze zootechnical performance, manage genetic diversity, and optimize breeding programs for productivity, disease resistance, and environmental adaptation. Ethical and economic considerations are integrated to promote sustainable and welfare-conscious breeding systems.

028ANA1I1 Calculus for Engineers I 2 Cr.

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

028ANA2I3 Calculus for Engineers II 4 Cr.

This course presents essential theoretical concepts related to differential equations and introduces numerical methods for solving such equations. It also explores content-rich integral topics: double and triple integrals, line integrals, the Green-Riemann theorem, and operations with Laplace transforms and their applications. Topics include Laplace transformations, Taylor expansions, integral calculus, double and triple integrals, numerical sequences, and differential equations.

028ANG4S2 English 4 4 Cr.

This course focuses on acquiring terminology specific to agriculture (soil, crop and animal production, agricultural issues) and the agri-food sector (food products, industrial processes, regulations). It develops oral and written English communication skills in professional contexts, fosters critical thinking, and prepares students for professional integration. Topics include agriculture and food-related vocabulary, oral presentations, debates, scientific writing, food processing steps, food additives, sensory evaluation, and case studies like chocolate.

028APICS2 Beekeeping and Honey 4 Cr.

This course introduces students to beekeeping practices and care for bees to optimize the production of honey, wax, and royal jelly. Topics include: bee colony structure, insect physiology, colony behavior, bee breeding, honey composition and quality.

028ARBRS3 Arboriculture of Rosaceae 2 Cr.

This course focuses on the cultivation of Rosaceae family fruit trees such as apple, pear, peach, plum, apricot, and cherry. It addresses botany, physiology, and agronomy from rootstock selection to harvest. Topics include planting, pruning, orchard management, crop practices, pest and disease management, fruit quality, and sustainable production challenges.

028ARSUS4 Subtropical Arboriculture 2 Cr.

The course covers the cultivation of subtropical fruit species like citrus (orange, lemon), avocado, mango, fig, and pomegranate. It explores agroecological requirements, propagation techniques, orchard management (planting, irrigation, pruning, fertilization), and integrated pest management. Emphasis is placed on fruit quality, climate change adaptation, and sustainable orchard systems linked to local and global markets.

076ARNAS5 Natural Resources Sanitation 2 Cr.

This course addresses methods and techniques to preserve and restore natural resource quality (water, soil, air). Topics include pollution, environmental degradation, and human impacts, along with sustainable sanitation strategies. Students will learn wastewater treatment, waste management, soil remediation, and risk prevention. This course also focuses on regulations, innovative technologies, and integrated practices for sustainable resource management.

028DESAS1 AutoCAD and Photoshop 2 Cr.

This practical course introduces students to AutoCAD and Photoshop, essential tools in technical design and visual communication. AutoCAD training includes 2D and 3D drawing, layering, dimensioning, layout, and professional plan printing. Photoshop instruction covers image editing, graphic design, visual composition, using layers, filters, adjustments, and typography tools. These digital design skills are relevant across architecture, planning, design, and agri-food sectors.

028AVICS4 Poultry Farming 2 Cr.

This course covers poultry farming, focusing on broilers and layers, and includes other bird species such as turkey, duck, and quail. It addresses biological, nutritional, and sanitary basics for efficient poultry production. Topics include incubation, feeding, housing, biosecurity, disease prevention and control, and regulations. Emphasis is placed on animal welfare, product quality (eggs and meat), and sustainable practices.

028BCHMI4 Metabolic Biochemistry 2 Cr.

This course explains the metabolism of various compounds in a cell and the concepts of control of metabolic pathway activities. It also covers the cellular processes that generate energy by analyzing energy transformations in plant and animal cells, including the basic principles of cellular respiration and photosynthesis.
Topics include: Introduction to metabolism and bioenergetics. Carbohydrate metabolism. Krebs cycle. Electron transport chain and oxidative phosphorylation. Lipid metabolism. Protein metabolism. Photosynthesis.

028BCHSI3 Structural Biochemistry 4 Cr.

This course focuses on the structure and physico-chemical properties of molecules constituting living matter: carbohydrates, amino acids and proteins, lipids and membranes, nucleotides and nucleic acids. It addresses the characteristics and properties of these molecules in order to understand their biological roles or functions as constituents of living matter or catalysts of metabolic reactions. The course also presents biochemical analyses used for quantification, separation, and characterization of these biomolecules. Topics covered include: PCR amplification. Amino acids and proteins. Protein analysis methods. Biological membranes. Enzymes. Carbohydrates. Nucleic acids (DNA and RNA). Fatty acids and lipids.

028BIGEI2 General Biology 4 Cr.

This course offers a comprehensive introduction to fundamental biological concepts, covering cell structure and function, genetics, organism physiology, biodiversity, as well as basics of ecology and evolution. Students will explore molecular, cellular, and organismal mechanisms that govern life, as well as interactions between organisms and their environment. This course provides an essential foundation to understand life sciences and their applications across various scientific and professional fields.

076BIPVS3 Biotechnologies and Plant Variety Protection 2 Cr.

This course covers applications of modern biotechnologies in the improvement and protection of cultivated plants. It includes genetic engineering techniques, marker-assisted selection, and methods of conservation and protection of plant varieties. Students will study issues related to intellectual property, breeder rights, and national and international regulations governing variety protection. The course also emphasizes the impact of these technologies on food security, agricultural sustainability, and biodiversity.

028CCPBI3 Career Coaching and Personal Branding 2 Cr.

This course aims to align student aspirations with the professional reality of the labor market and business world. It involves positioning oneself relative to a sector, professional branch, and occupation.
The goal is to undertake the development of a professional project necessary for orientation towards internships, future training, or forthcoming employment.

028CHIAI4 Analytical Chemistry 4 Cr.

This course enables students to: define the steps necessary to prepare a sample for analysis, understand and master the main extraction techniques for organic molecules, understand and master the main extraction techniques for minerals, understand and master the main spectroscopic techniques, understand and master the main chromatographic techniques, perform critical reading of a scientific article, and analyze different types of chromatograms.
Topics covered include: Sampling. Extraction techniques for organic compounds. Extraction techniques for minerals. Chromatography. Gas chromatography (GC). Liquid chromatography (HPLC). Atomic absorption. ICP-MS. Quantifications.

028CHISI2 Solution Chemistry 4 Cr.

This course enables students to define the different types of chemical reactions, recognize the basic concepts related to chemical kinetics, and recognize the basic concepts related to chemical equilibrium. Furthermore, they will be capable of solving equilibrium problems, as well as characterizing and differentiating acids and bases. The course also covers the ability to recognize the applications of equilibrium in aqueous solution, to recognize the basic concepts in electrochemistry, and finally, to use the concept of electrode potential in various applications.

028CHENI2 Environmental Chemistry 2 Cr.

This course provides students with the tools to understand chemical and anthropogenic environmental issues. It examines, at the molecular level, the processes governing the functioning and evolution of natural ecosystems, including the atmosphere, water, and soil. The course first presents an overview of major environmental compartments, then details the chemistry and physico-chemistry of molecules within them. Students will learn to apply this knowledge to develop environmentally respectful production techniques, implement effective natural resource management policies, and address contamination and pollution from human activities.

028CHIGI1 General Chemistry 4 Cr.

This course covers fundamental chemistry concepts to provide a solid foundation for organic and analytical chemistry, essential for understanding food chemistry and biochemistry. Topics covered include: Atom. Periodic classification of elements. LEWIS model of molecules and ions. Association of atoms: molecules and ions. Resonance. Molecular polarity. States of matter.

028CHIOI3 Organic Chemistry 4 Cr.

This course introduces fundamental notions of structure, nomenclature, stereochemistry, and reaction mechanisms and provides students with sufficient mastery of the language (terminology) corresponding to these concepts. It also integrates these notions in explaining organic reaction mechanisms and studying various addition and substitution reactions.
Topics covered include: Introduction to organic chemistry. Stereochemistry. Conformations. Physical organic chemistry. Organic reaction mechanisms. Reactivity of simple organic functions (alkanes, alkenes, alkynes, organomagnesiums, halogenated derivatives, and alcohols) using main types of reaction mechanisms. Nomenclature. Organic Chemistry Practical Work.

028COMPI4 Accounting and Management Tools 2 Cr.

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

028CGPAS4 Design and Management of an Agricultural Project 4 Cr.

This course enables students to conduct field experiments, developing autonomy in experimentation and data analysis. It covers the development of experimental plans, sowing of test varieties (winter crops), crop monitoring, harvesting, data collection, statistical analysis, and drawing conclusions.

028CONPS4 Landscape Design Concepts 2 Cr.

This course introduces fundamental landscaping principles related to green spaces, agricultural, urban, and natural areas. It addresses spatial composition, balance, aesthetics, functionality, and environmental integration. Students will learn site analysis, landscape plan design, selection of suitable plants, and integration of built elements (paths, walls, water features). It also highlights ecological, cultural, and social landscape challenges and promotes sustainable and resilient practices to address climate change. The goal is to develop a global and coherent vision of landscape space, from design to management.

076CRBES5 Corporate Social Responsibility and Business Ethics 2 Cr.

This course explores the foundations of corporate social responsibility (CSR) and ethics in business. It addresses social, environmental, and economic issues organizations face, as well as ethical principles guiding decisions. Students will analyze international frameworks (UN, ISO 26000, Global Compact), CSR integration strategies in business models, and ethical governance mechanisms. Case studies highlight responsible practices in human rights, sustainable development, transparency, fairness, and anti-corruption. The course aims to train decision-makers able to reconcile economic performance with positive social impact.

028CULHS4 Soilless Cultivation 2 Cr.

This course focuses on plant production techniques without soil use, notably hydroponic, aeroponic systems, and inert or organic substrates. It covers physiological principles of soilless-grown plants, nutrient solution formulation, irrigation management, climate parameter control, and disease prevention. Students will learn to design, install, and manage production units for market gardening, aromatic, or fruit crops in controlled or semi-controlled environments. The course emphasizes system advantages in yield, water economy, sustainable intensification, and adaptation to urban or constrained agriculture.

028CULMS3 Vegetable Crops 4 Cr.

This course focuses on the cultivation of vegetables and edible plants for food. It covers soil preparation, sowing, planting, irrigation, fertilization, pest and disease management, and harvesting. It aims to teach students how to ensure sustainable, healthy, and high-quality production while optimizing yields.

028DEVCI2 Personal Development and Organizational Behavior 2 Cr.

This course develops the student's personality and managerial capabilities. It examines the individual's place and importance in the company, human behavior, motivation (self and others), empowerment and delegation, teamwork and conflict management, organizational behavior, leadership, supervision, and management.

028DEHOI2 Olive Oil Tasting 2 Cr.

This course introduces the sensory analysis of virgin olive oil, focusing on recognizing its organoleptic qualities and potential defects. Students will learn to identify aromas, flavors (fruity, bitter, pungent), and typical profiles of different olive varieties, as well as the influence of agronomic, technological, and territorial factors on product quality. The course will also cover classification criteria (extra virgin, virgin, lampante), standardized tasting methods, and the relationship between taste, nutritional quality, and commercial valorization. It aims to train professionals capable of evaluating, selecting, and promoting high-quality olive oils in gastronomic, agricultural, or commercial contexts.

028DEGUI1 Wine Tasting 2 Cr.

This course introduces students to the art and science of wine tasting. It covers key steps of sensory analysis — visual, olfactory, and gustatory — as well as the technical vocabulary used to describe a wine's characteristics (color, aromas, balance, persistence, etc.). Students will learn to identify main grape varieties, winemaking styles,

wine regions, and food-wine pairings. The course also includes concepts of viticulture, oenology, and wine service. It aims to develop a critical, cultural, and professional appreciation of wine in a respectful, responsible framework suitable for gastronomic or commercial contexts.

028DRTLI2 Lebanese Labor Law 2 Cr.

This course provides essential legislative knowledge in labor law to ensure future engineers acquire the minimum level of understanding required for future employees or managers of employees.

028ECOLI1 Fundamental Ecology 2 Cr.

This course covers the fundamental aspects of ecology as an environmental science. It addresses the conservation of threatened species and human-induced environmental degradation once these concepts are understood. It serves as a "showcase of ecology."
By the end of this course, students will understand fundamental general ecology concepts, including ecological niche, biotic and abiotic factors, interactions in biocenoses, energy flow and matter cycles, and all factors regulating ecosystem functioning.
Key topics include: General organization of the biosphere. Structure of biocenoses and ecosystems. Ecological factors. Population ecology. Ecological monitoring.

076ECOAS1 Market Economics 2 Cr.

This course familiarizes students with the concept of the food system and its actors. It teaches basic concepts of the value chain approach, complemented by industrial and competitive analysis, covers the dynamics of consumption and food product markets, the various actors in the food system, and enables students to apply analytical tools to Lebanese agri-food chains.
Key topics include: Definition of agri-food economics. History of food acquisition and typology of food societies. Application on Lebanese agri-food chains. Introduction to the systemic approach and the food system. The food system: identification of subsystems. Theoretical approaches and application to the food system. Agri-food value chains. Industrial analysis. Competitive analysis applied to the agri-food sector. Food product markets: consumption, demand, international trade. Actors in the food system: distribution, agri-food industry, agriculture, and agri-supply.

028ECOGI4 General Economics 2 Cr.

This course enables students to understand the economic context in which business management problems arise.
Key topics include: Basic definitions. Workforce. Economic circuit and main aggregates of national accounts. Consumption. Public expenditure. Main types of economic organization. Investment.

028PHY2I2 Electricity and Mechanics 2 Cr.

This course introduces basic knowledge such as speed, acceleration, and force in a rigid system.
Key topics include: Definition and explanation of energy and work done by a moving body. Distinguish between energy conservation and non-conservation cases. Momentum theorem. Study of the free and damped harmonic oscillator with applications. Electricity: current circuits (resistors, capacitors, coils, circuits (R, C), (R, L), (L, C), and (R, L, C) in DC and AC, principles, laws). Study of electrical networks and active/passive dipoles. Explanation of Kirchhoff's laws for circuit resolution. Study of q(t), i(t), u(t) in variable regime. Notion of electrostatics. Laplace and Lorentz forces. Ohm's law. Electrical networks. Kirchhoff's laws. Circuits (R, C), (R, L), (L, C), and (R, L, C) in variable regime. Sinusoidal alternating current. Fresnel construction. Diodes and filters.
Mechanics: kinematics and dynamics of a particle. Work of a force. Momentum. Angular momentum. Free and damped harmonic oscillator.

028EPBMI4 Engineering Properties of Biological Materials 2 Cr.

This course focuses on studying the physical properties of biological materials, with particular emphasis on agricultural products. Students will learn to characterize essential parameters such as density, porosity, texture, thermal conductivity, mechanical, and hygroscopic properties of plant or animal materials. This knowledge is fundamental for designing and optimizing harvesting, processing, storage, and transportation processes. The

course integrates both theoretical and practical approaches, allowing students to understand the importance of these properties in developing efficient, sustainable, and adapted agri-food systems and equipment.

028ENAPS3 Applied Entomology 2 Cr.

This course focuses on the study of insects with a direct impact on agriculture, public health, and the environment. It covers identification of main pest and beneficial species, their biology, ecology, as well as integrated control methods, including biological, chemical, and cultural means. Students will learn to assess insect populations, implement sustainable control strategies, and minimize negative impacts on biodiversity. The course aims to develop practical skills for integrated insect management in agricultural systems and natural spaces.

028ENNUI1 Digital Environment 4 Cr.

This course enables students to understand the functioning of a computer on a hardware level, then to master the use of its operating system and some office software, as well as techniques for using presentation and communication tools. Students will also learn to use major internet services and create static websites.

028EXPES4 Experimentation 2 Cr.

This course introduces students to the principles and methods of scientific experimentation applied to agriculture, agri-food, and life sciences. It covers key steps of conducting an experiment: formulating hypotheses, choosing experimental design (block plans, randomization, replications), data collection and processing, statistical analysis, and result interpretation. Students will learn to design rigorous protocols, use appropriate analysis tools, and write scientific reports. The course aims to develop critical thinking and scientific autonomy for conducting reliable and relevant experiments in the field or laboratory.

076FCHOS3 Chocolate Making 2 Cr.

This course introduces students to the stages of transforming cocoa into chocolate: fermentation, roasting, grinding, conching, tempering, and molding. It also covers quality criteria, artisanal and industrial techniques, as well as hygiene standards. Through practical workshops and tastings, students will discover the science behind the texture, aroma, and flavor of chocolate, while developing an understanding of the issues related to the origin of the beans and sustainability.

028FEPIS1 Fertilization Principles 2 Cr.

This course presents the fundamental principles of crop fertilization, addressing plant nutritional needs, the roles of essential mineral elements (nitrogen, phosphorus, potassium, etc.), and mechanisms of absorption and assimilation. Students will study different types of fertilizers (organic, mineral, organo-mineral), application methods and timing, as well as the effects of fertilization on plant growth, crop quality, and soil health. The course also emphasizes sustainable practices to optimize fertilization efficiency while limiting environmental impacts, such as water pollution and soil degradation.

028GENEI3 General Genetics 2 Cr.

This course covers the basics of gene structure and regulation of gene expression, understanding the mechanisms of inheritance of genetic traits, and sources of genetic variability.
Key topics include: Introduction to genetics. Cytogenetics. Mitosis and the cell cycle. Meiosis and genetic consequences. Extensions of Mendelian genetics. Genes and traits as the carriers of genetic information. Transcription and regulation of gene expression. Bacterial genetics. Modification of genetic information.

028GÉOGI2 Geography 2 Cr.

The course addresses various climatic elements that can influence the distribution and determination of crop types, different erosion agents leading to the formation of soils suitable for cultivation, correlations between crop yields and climate variations, the representation of Earth's surface forms and their particular features, altitude differences, and slope shapes through topographic maps (reading, analysis, and topographic profiles).
Key topics include: Geography: definitions, evolution, and goals. Climate and agriculture. Geomorphology (external dynamics of continents). Topography.

028GÉOLI2 Geology 2 Cr.

This course introduces the physical properties of the Earth and its internal dynamic mechanisms. It covers mineral matter (minerals) and rocks (igneous, sedimentary, metamorphic), major geological phenomena like volcanism and earthquakes, the resulting landscapes, and the consequences of groundwater and surface water circulation. Key concepts studied include Geothermics, Magnetism, Density, Earth's Structure, Seismic Waves, Age of the Earth, and deformations of the Earth's crust (folds, fractures, thrusting, and nappe formation). The course also includes Paleontology (geological time and eras, fossils) and Structural Analysis (microtectonics, orogenic theories), as well as Stratigraphy and Paleogeography.

028GESTS1 Business Management 2 Cr.

This course introduces future engineers to the world of entrepreneurship by framing the company as an open socio-economic system that brings together human, material, intangible, and financial resources in an organized manner to provide innovative goods or services to customers in an increasingly competitive environment, with objectives of added value, profitability, and responsibility.

076GCGSS5 Conflict Management, Stress Management 2 Cr.

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

028GEFAS4 Management of Auxiliary Flora 2 Cr.

This course covers the study and management of weeds in agricultural systems, focusing on their identification, ecology, and impact on crops. Students will learn mechanical, chemical, and biological control methods for weeds, as well as cultural practices favoring integrated and sustainable management of auxiliary flora. The course also addresses interactions between weeds, crops, and the environment, highlighting agronomic, economic, and ecological challenges linked to weed control for optimizing yields while preserving biodiversity.

028DGPAS2 Management of Agricultural and Industrial Waste and Byproducts 2 Cr.

This course covers methods and techniques for managing waste and byproducts from agricultural and industrial sectors. It addresses waste characterization, environmental impact, valorization processes (composting, methanization, recycling), and treatment (incineration, controlled storage). Students will study regulatory frameworks, good sustainable management practices, and technological innovations aimed at reducing waste production and promoting the circular economy. The course also emphasizes economic, health, and environmental issues linked to effective residue management to minimize risks and optimize resources.

028FOREI4 Forest Area Management 2 Cr.

This course provides students with the essential theoretical and practical knowledge to manage forest resources in a sustainable and multi-functional manner. By the end of this course, students will be able to analyze the structure, function, and dynamics of forest ecosystems, identify the main threats (pathologies, climate risks), and understand the legal framework, governance, and certification mechanisms of the timber industry.

076GMDCS5 Global Marketing and Digital Communication 2 Cr.

This course provides an in-depth understanding of international marketing strategies and digital communication. It covers fundamental principles of global marketing, international market analysis, product and message adaptation to different cultures, and challenges linked to globalization. Students will study digital communication tools and platforms (social media, SEO, content marketing, online advertising), customer engagement strategies, and methods to measure digital performance. Through case studies and practical projects, the course prepares students to design and manage effective marketing campaigns in a global and digitalized environment.

028GOPI4 Public and Institutional Governance 2 Cr.

This course explores the principles, structures, and processes of public governance, as well as the role of institutions in managing public affairs. It analyzes decision-making mechanisms, power distribution, transparency, accountability, and citizen participation in democratic systems. Students will also study different forms of public organizations, public policies, and challenges related to effective governance, corruption, and institutional reform. The course aims to provide a deep understanding of institutional dynamics to prepare actors capable of improving management and governance of communities and states.

028GRCUS2 Field Crops 2 Cr.

This course addresses production and management techniques for large-scale crops, including cereals (wheat, corn, barley, etc.) and legumes intended for human and animal consumption (peas, beans, alfalfa, clover, etc.). Students will learn the agronomic requirements of these crops, optimal cultural practices (sowing, fertilization, irrigation, phytosanitary protection), and integrated pest and disease management. The course emphasizes adapting production systems to agroclimatic conditions, crop rotation, and strategies to improve productivity and sustainability of agricultural operations.

028HALIS4 Fisheries 2 Cr.

This course deals with the sciences and techniques related to fishing and the exploitation of aquatic resources. It covers the biology of fishery species, marine and freshwater ecosystems, sustainable fishing methods, stock management, as well as economic and social aspects of the fishing industry. Students will learn principles of aquatic resource conservation, current regulations, and technologies used to optimize production while preserving the environment. The course aims to train professionals capable of sustainably managing fishery resources in a responsible development context.

028HORTS4 Ornamental Horticulture and Protected Crops 2 Cr.

This course focuses on the production and management of ornamental plants as well as protected crops (greenhouses, tunnels). It covers botanical, physiological, and agronomic aspects of ornamental horticultural species, propagation techniques, cultural management, phytosanitary protection, and methods to optimize growth conditions in protected environments. Students will also learn to manage aesthetic quality, environmental requirements, and economic challenges related to horticultural production. The course emphasizes sustainable and innovative practices adapted to enhancing green spaces and specialized markets.

028HYAGS1 Hydrology and Agrometeorology 4 Cr.

This course enables students to understand the different elements of the water cycle and the influence of each element on water availability for irrigation of agricultural lands. It teaches them about surface and underground flow processes at the watershed level for proper water resource management.
Key topics include: Surface hydrology. Watershed and its complexes. Natural environment: description and functioning. Infiltration and flow in the infiltration process. Aquifers: types and circulation. Irrigation water pollution.

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

This course explores ethical issues related to the use of AI in agriculture and agri-food sectors. It addresses social, economic, environmental, and legal implications of AI technologies in food production, processing, traceability, and distribution. Topics include algorithmic transparency, data protection, model bias, equitable access to innovation, sustainability, regulation, and international standards. Case studies encourage responsible integration of AI in food systems.

028INAGI2 Agricultural and Agri-food Initiation I 2 Cr.

This course covers the characteristics of the agricultural world through the different sectors of agronomy, exploration of a farm operation via surveys, visits to agricultural and agri-food businesses, and practical experience in agriculture and food production.

028IAIII3 Agricultural and Agri-food Initiation II 2 Cr.

This course introduces basic agricultural techniques on a farm. Students will become familiar with and practice basic plant production techniques (planting, sowing, weeding, pesticide spraying, fertilizer application, driving a tractor, hitching a plow, etc.). Regarding animal production, students will learn how to clean a barn and mechanically milk a cow. The last part of this course focuses on an introduction to the hygiene rules to be followed in a dairy as well as a brief description of the various production steps for a fresh cheese (or white cheese).
Key topics include: Applied cultivation techniques in an agricultural plot. Techniques applied on a cattle farm (mechanical milking, etc.). Hygiene rules adopted in a dairy during cheese production.

028INEAS2 Introduction to Agricultural Entomology 2 Cr.

This course introduces insects of agricultural importance, exploring their biology, ecology, and role in agroecosystems. Students will learn to identify major harmful and beneficial species, understand their life cycles, interactions with crops, and integrated pest management methods aimed at minimizing damage while preserving biodiversity. The course emphasizes sustainable population management principles to optimize crop protection and reduce pesticide use.

028INPHS2 Introduction to Phytopathology 2 Cr.

This course presents the fundamental notions of phytopathology, the science studying plant diseases caused by pathogens such as fungi, bacteria, viruses, nematodes, and phytoplasmas. Students will discover infection mechanisms, disease symptoms, pathogen life cycles, as well as diagnostic and control methods. The course also addresses integrated management strategies aimed at preventing and limiting yield losses while respecting the environment. This introduction prepares for an in-depth understanding of plant-pathogen interactions in a sustainable agricultural context.

076INM1S1 Introduction to Marketing 2 Cr.

This course introduces the fundamental concepts of marketing, focusing on understanding consumer needs and behaviors, market analysis, and product, pricing, distribution, and communication strategies. Students will discover the tools and methods used to design and implement effective marketing plans, adapted to different competitive environments. Through case studies and practical assignments, the course aims to develop a strategic and operational approach to marketing in both a national and international context.

028INENI1 Introduction to Engineering 2 Cr.

This course provides an overview of the fundamental concepts and practices in engineering. Students will be introduced to the various engineering disciplines, problem-solving techniques, design processes, and the role of engineers in society. Topics include basic principles of mechanics, materials science, electrical circuits, and computer-aided design (CAD). Emphasis is placed on developing analytical thinking, teamwork, and communication skills through practical projects and case studies. The course also aims to prepare students for further specialized studies in engineering fields.

028INPYI4 Introduction to Python 2 Cr.

This course offers a comprehensive introduction to the Python programming language, known for its simplicity and versatility. Students will discover fundamental concepts such as variables, data types, control structures (conditions, loops), functions, as well as file manipulation and basics of object-oriented programming. Through practical exercises, they will learn to develop efficient scripts to solve various problems, notably in data analysis, automation, and simple application development. This course provides a solid foundation for progressing to more advanced applications in programming and data science.

028AGIRS3 Irrigation 4 Cr.

This course addresses the principles and techniques of irrigation applied to agriculture, aiming to ensure an optimal water supply to crops to maximize yield while preserving water resources. Students will study different irrigation methods (drip, sprinkler, surface), water management, assessment of plant water needs, as well as

environmental impacts related to irrigation. The course also includes the use of modern technologies for irrigation system control and management, from the perspectives of efficiency, sustainability, and adaptation to climate change.

028IOTHS3 IoT (Internet of Things) 2 Cr.

This course introduces the fundamental concepts of the Internet of Things (IoT), a key technology for collecting, transmitting, and analyzing data from connected objects. Students will discover IoT system architecture, sensors and actuators, communication protocols, as well as data management and processing platforms. The course emphasizes concrete IoT applications in various sectors, notably smart agriculture, environmental management, health, and Industry 4.0. Through practical projects, students will learn to design and deploy IoT solutions to improve efficiency, decision-making, and sustainability.

435LALML2 Arabic Language and Media 2 Cr.

This course explores the relationships between the Arabic language and contemporary media, analyzing how language is used, adapted, and transformed across different media types (print press, television, radio, social networks, digital platforms). Students will study linguistic variations, language registers, as well as communication, cultural identity, and media influence issues in the Arab world. The course also emphasizes editorial practices, information processing, and dissemination strategies in a constantly evolving media environment.

028TLESI4 Talent Management and Leadership: Strategic Issues 2 Cr.

This course explores key concepts of talent management and leadership within organizational contexts, emphasizing their strategic role in business performance and competitiveness. Students will study processes of talent identification, development, and retention, as well as leadership styles and skills suited to contemporary challenges. The course also addresses diversity management, employee motivation, change management, and building positive organizational cultures. Through case studies and practical exercises, participants will develop skills to lead teams effectively and support organizational transformation.

064VALEL1 USJ Values in Daily Life 2 Cr.

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

026MALES4 Machine Learning 2 Cr.

This course covers machine learning, a branch of artificial intelligence focused on developing algorithms that learn from data and improve performance without explicit programming. It presents supervised, unsupervised, and reinforcement learning, applied in image recognition, natural language processing, prediction, and process automation.

028MAAGS2 Agricultural Machinery 2 Cr.

This course covers equipment and machines used in agricultural activities, explaining their design, operation, maintenance, and optimal use. Students will study different types of machinery — tractors, soil tillage tools, seeders, sprayers, combine harvesters — as well as technological innovations aimed at improving efficiency, safety, and sustainability of agricultural operations. The course also focuses on economic management of equipment fleets, preventive and corrective maintenance, and environmental impacts of agricultural machinery.

076MSCAS5 Supply Chain Management and Logistics 4 Cr.

This course covers the principles and practices of managing the supply chain and logistics activities essential to ensure product availability while optimizing costs and service quality. Students will study procurement, production, storage, transport, and distribution processes, as well as tools for planning, inventory management,

and flow control. The course also emphasizes digital technologies integration (ERP, traceability systems), risk management, sustainability, and continuous improvement strategies in a global and competitive context.

076MFABS5 Managerial Finance for Agribusiness 4 Cr.

This course presents fundamental principles of finance applied to the agribusiness sector. It covers financial management of farms and agro-industrial companies, focusing on budgeting, cost analysis, cash flow management, investment evaluation, and project financing. Students will learn to use financial tools to make informed decisions, optimize profitability, and ensure economic sustainability of agricultural activities in a market environment marked by fluctuations and sustainability challenges. The course also integrates financial risk management specific to agriculture.

028MATHI1 Mathematics for Engineers 4 Cr.

This course aims to link mathematical foundations (sequences and functions) to concrete applications in agronomy. It demonstrates how mathematics can model agricultural phenomena such as growth, yield, or financial management of farms.

028PHY3I3 Fluid Mechanics 2 Cr.

This course explains the proper design of structures from the standpoint of stability, emphasizing sizing and reviewing different materials used in engineering.
Key topics include: Introduction to fluid mechanics. Fluid statics. Dynamics of perfect and incompressible fluids. Dynamics of viscous and incompressible fluids. Dynamics of compressible fluids.

028MDFES6 Final Year Project 30 Cr.

This course introduces the student to pre-professional or scientific research through the exploration and testing of new techniques for application in enterprises or farms, thesis writing, and project defense before a panel of experts. The final project lasts at least six months, during which the student conducts experiments, collects and analyzes data, and draws conclusions. It can cover any specialty, including crop production, animal production, economics, or forestry.

076MGPRS5 Project Management Methodology 2 Cr.

This course presents essential principles, tools, and techniques for effective project management across various sectors. It covers key project life cycle phases: initiation, planning, execution, monitoring, and closure. Students will learn to define objectives, develop schedules, manage resources, assess risks, and ensure stakeholder communication. The course includes recognized software and methods (Gantt charts, PERT, Agile) to optimize project performance. Through case studies, students will develop skills to manage complex projects, respect deadlines and budgets, and ensure quality outcomes.

028MICRI4 General Microbiology 4 Cr.

This course explores the functioning of microorganisms (bacteria, viruses, etc.), their role in agriculture (soil-plant complex / phytopathology) and the agro-food industry (fermented products / food poisoning), and deepen knowledge in human immunology.
Key topics include: General microbiology. Pathogenicity of bacteria. Viruses. Soil microbiology. Applications in medicine, agriculture, and agro-food industry. Example: wastewater treatment. Lab practicals: microbial cultures (techniques for identification and isolation of specific bacteria).

076COCNS2 Nutrition and Communities 2 Cr.

This course covers nutrition and food consumption at the level of individuals, households, and communities. It examines the specificity of food consumption models across various community categories worldwide, as well as socioeconomic, cultural, and psychological factors influencing individuals' eating behaviors within communities. It aims to explain the development of assessment, planning, and intervention nutrition programs that protect public health, also presenting basic methods of nutrition education for targeted groups.

028NUTRI4 Human Nutrition 4 Cr.

This course covers nutrition, the science of the relationships between humans and food. It focuses on biological processes related to nutrient utilization, food health, and nutritional needs.
Key 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. Seasoning lipids. Food additives. Dietetics.

028PATHS4 Animal Pathology 2 Cr.

This course focuses on diseases affecting farm and domestic animals, covering causes, mechanisms, symptoms, and sanitary and economic consequences. Students will learn to identify major infectious, parasitic, metabolic, and toxic conditions, diagnostic methods, prevention, and treatment. The course also emphasizes epidemiological aspects, herd health management, and biosecurity measures to limit disease spread. It prepares future professionals to ensure animal health for sustainable production and sanitary safety.

028PEDOS1 Pedology 4 Cr.

This course aims to understand soil, its physical and chemical properties, its mineral, organic, and biological components, texture and structure, porosity, water, air, and cation exchange capacity.
Key topics include: Pedology. Pedogenesis. Soil classification.

028PEPIS4 Nurseries 2 Cr.

This course deals with production and management techniques for nursery plants, essential for crop production, agriculture, horticulture, and landscaping. Students will learn propagation methods (seeding, cuttings, grafting), optimal nursery culture conditions, substrate management, irrigation, nutrition, and phytosanitary protection of young plants. The course also covers nursery production organization, planning, and economic aspects related to plant quality and marketing.

028PHANS1 Animal Physiology 4 Cr.

This course covers the following: Animal development. Main functions of the animal organism: physiological system organization. Maintaining balance: homeostasis and biological regulation. Reproduction: genital system. Respiration: respiratory system. Nutrition: digestive system. Internal transport: cardiovascular system. Waste elimination: excretory system. Perception of the external world: sensory system. Communication, analysis, and coordination: nervous system. Action: skeletal and muscular systems. It also includes lab practicals.

028PHVEI4 Plant Physiology 4 Cr.

This course includes the following: Plant nutrition and development. Crop production at the engineering level. Nutrition. Growth and development. Lab practicals.

028PHAPS3 Applied Phytopathology 2 Cr.

This course addresses the fundamental principles related to plant diseases caused by pathogenic agents (fungi, bacteria, viruses, nematodes) and by abiotic factors. It covers the mechanisms of plant infection and defense, diagnostic methods, as well as disease management and control approaches from a perspective of agricultural sustainability. The objective is to provide students with the scientific and applied foundations necessary for understanding and controlling plant-pathogen interactions.

028PHYPS4 Phytopharmacy 2 Cr.

This course covers the principles and practices related to the use of plant protection products (pesticides) for crop protection against pests, diseases, and weeds. Students will study the different types of pesticides (fungicides, insecticides, herbicides), their modes of action, their formulation, as well as effective and safe application techniques. The course emphasizes regulatory aspects, risks to human health and the environment, and integrated pest management (IPM) strategies aimed at reducing the use of chemical products and promoting sustainable alternatives.

028PARMI2 Aromatic and Medicinal Plants 2 Cr.

This course covers the sustainable management of aromatic and medicinal plants, through the identification of key species and the understanding of their ecology, the mastery of the biochemistry of active compounds (essential oils, alkaloids) and extraction techniques, the evaluation of cultivation and post-harvest methods to ensure quality, the understanding of applications in phytotherapy, cosmetics, and the agri-food industry, as well as knowledge of the regulatory framework (quality standards, certification).

028POAGS2 Agricultural and Food Policies 2 Cr.

This course analyzes the frameworks, instruments, and stakes of public policies in agriculture and food sectors at national, regional, and international levels. Students will study policy objectives such as food security, rural development, environmental sustainability, and economic competitiveness. The course covers producer support mechanisms, market regulations, trade negotiations, as well as social and environmental impacts of policies. Through case studies, students will develop critical understanding of institutional and economic dynamics influencing contemporary agricultural and food systems.

028PRSTI3 Probability and Statistics 4 Cr.

This course covers basic principles related to descriptive statistics (measures of central tendency, dispersion, skewness and kurtosis, graphical representations) and inferential statistics (hypothesis testing).
Students will develop theoretical knowledge and practical skills to apply statistical concepts to real research situations in agronomic and agro-food sciences.
Key topics include: Introduction. Descriptive statistics. Normal distribution. Sampling theory. Hypothesis tests: chi-square, t-test, ANOVA, correlation, linear regression. Non-parametric tests. Multivariate statistics.

076REOPS2 Operational Research 2 Cr.

This course provides scientific knowledge to manage investments and adjust asset portfolios based on risk and expected returns. It presents operations research methods and probability laws that help decision-makers select the most appropriate solutions.

028SCENI2 Environmental Sciences 2 Cr.

This course addresses environmental issues by examining its components, presenting problems caused by human activity, and analyzing their causes and potential solutions.
Key topics include: Environment and its history. Environmental sciences. Affecting factors. Impacts. Environmental protection. Legislation and regulation.

076SGDES5 Science, Engineering, and Environmental Sustainability 4 Cr.

This course explores the scientific and technical principles applied to environmental protection and sustainability. It emphasizes the integration of science, engineering, and sustainable innovations to address challenges such as natural resource management, energy transition, pollution reduction, and climate change adaptation. The objective is to prepare students to design and implement sustainable solutions that combine technological efficiency with environmental responsibility.

028SIGDS5 GIS: Diagnostic and Forecasting Tool 2 Cr.

This course presents Geographic Information Systems (GIS) as powerful tools for diagnosis and forecasting in agriculture, environment, and land use planning. Students will discover GIS fundamentals, spatial data collection, processing, and analysis. Emphasis is placed on practical applications such as soil mapping, natural resource management, crop monitoring, and risk modeling (erosion, flooding, diseases). Through exercises and case studies, students will learn to use GIS software to support decision-making and optimize territorial management strategies.

076SEMIS5 Seminar 2 Cr.

This course provides a space for exchanges and reflections on specialized themes related to students' fields of study. It fosters development of oral and written communication skills through presentations, critical analysis of scientific articles, and active participation in discussions. Seminars also deepen knowledge on current topics, technological innovations, or professional challenges, often involving guest speakers or research projects.

028STG2S1 Internship 2 2 Cr.

This course enables students to apply theories learned during the academic year in practice and become familiar with the professional world through training internships in Lebanese or foreign research institutes or production companies.
Successful completion of the course requires participation in research and laboratory analyses of agricultural products in a research institute (IRAL, IFAD, IRA) for one month in summer, and participation in activities in an agricultural farm for one month in summer.

028STG3S3 Internship 3 2 Cr.

This course enables students to apply theories learned during the academic year in practice and become familiar with the professional world through training internships in Lebanese or foreign research institutes or production companies.
Successful completion of the course requires participation in research and laboratory analyses of agricultural products in a research institute (IRAL, IFAD, IRA) for one month in summer, and participation in activities in an agricultural farm for one month in summer.

076STAPS1 Applied Statistics 2 Cr.

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

028TEXPI1 Expression Techniques in Digital Era 4 Cr.

This course trains students in communication within academic and professional environments. It provides linguistic and methodological tools to master principles of oral and written communication in these contexts. It also develops general skills (or transversal competencies) necessary to better follow specialty courses.
Key topics include: Techniques for reformulating information. Bibliographic references. Minutes and reports. Oral presentations. Scientific communication. Professional insertion documents. Letters or emails of claim or information.

028TPRAS5 Post-Harvest Technologies of Agricultural Products 2 Cr.

This course covers methods and technologies for conservation, processing, and valorization of agricultural products after harvest. Students will study physico-chemical principles of post-harvest processes, storage techniques, packaging, drying, cooling, and treatment, as well as impacts on quality, food safety, and product shelf life. The course emphasizes technological innovations aimed at reducing post-harvest losses, improving energy efficiency, and promoting sustainability in agricultural value chains.

028PHY1I1 Thermodynamics 2 Cr.

This course is a foundational and formative subject. Its study constitutes a highly formative mental exercise, accustoming students to scientific and logical thinking and influencing their training as future engineers.
Key topics include: Thermometry. Study of ideal gases. Calorimetry. Study of different types of transformation.

The two laws of thermodynamics. Thermodynamic state functions: internal energy U, enthalpy H, entropy S, Helmholtz free energy F, Gibbs free energy G. Physical equilibria.

028TOATI1 Topography and Land Planning 2 Cr.

This course covers principles and techniques of topography applied to the development of agricultural, urban, and rural lands. Students will learn to perform accurate topographic surveys, interpret geometric data of terrain, and use modern tools such as total stations, GPS, and drones. The course also addresses design and planning methods for land development (earthworks, drainage, leveling), considering environmental constraints and future uses. Through practical work and case studies, students will develop skills to optimize land use and enhancement.

028PHY4I4 Heat Transfer 2 Cr.

This course enables students to understand physical phenomena of heat and energy transfer related to agriculture and agro-food sectors.
Key topics include: Sources and forms of energy. Importance of renewable sources. Main definitions. Units. Different modes of heat transfer. Heat conduction. Heat convection. Heat radiation. Applications.

028TRMAI3 Mass Transfer 2 Cr.

This course covers fundamental principles of mass transfer phenomena in agro-industrial and environmental systems. It addresses diffusion, convection, and adsorption mechanisms, as well as mass exchanges between solid, liquid, and gaseous phases. Students will study practical applications related to nutrient transport, contaminants, and products in soils, crops, waters, and food processing. The course also includes analysis of mathematical and experimental models to predict and optimize transfers for sustainability and efficiency.

028VITIS4 Viticulture 2 Cr.

This course covers principles and practices of vine cultivation, from planting to harvest. It addresses agronomic aspects such as rootstock selection, vineyard management, pruning, irrigation, and fertilization, as well as pest and disease control specific to vineyards. Students will also study environmental factors (climate, soil, topography) affecting quality and quantity of production. The course emphasizes sustainable techniques and innovations to optimize productivity while respecting environment and biodiversity.

028VCACS3 Volunteer and Citizen Action 2 Cr.

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

028ZOOTS2 Animal Science and Animal Products 4 Cr.

This course aims to introduce future engineers to the diversity of animal productions and the specific technicalities of each type of farming, and to help them acquire precise zootechnical vocabulary.