



UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2024/25
BACHELOR

SCIENCE AND TECHNOLOGY FOR SUSTAINABLE FOOD (Classe L-26)

Enrolled from academic year 2023/2024

HEADING

Degree classification - Denomination and code:	L-26 Food Sciences
Degree title:	Dottore
Length of course:	3 years
Total number of credits required to complete programme:	180
Years of course currently available:	1st , 2nd
Access procedures:	Cap on student, student selection based on entrance test
Course code:	G33

PERSONS/ROLES

Head of Study Programme

Prof. Francesco Enzo Molinari

Tutors - Faculty

Tutor per i piani di studio:

lettera iniziale cognome studenti A-BE: Prof.ssa Stefania Iametti

lettera iniziale cognome studenti BI-CE: Prof.ssa Manuela Silvia Rollini

lettera iniziale cognome studenti CH-DI: Prof.ssa Cristina Alamprese

lettera iniziale cognome studenti DO-GI: Prof.ssa Luisa Maria Pellegrino

lettera iniziale cognome studenti GL-LU: Prof.ssa Alyssa Mariel Hidalgo Vidal

lettera iniziale cognome studenti MA-MU: Prof.ssa Barbara Brunetti

lettera iniziale cognome studenti NA-PE: Prof.ssa Sara Limbo

lettera iniziale cognome studenti PH-RI: Prof. Alberto Giuseppe Barbiroli

lettera iniziale cognome studenti RO-TA: Prof.ssa Maria Stella Cosio

lettera iniziale cognome studenti TE-Z: Prof.ssa Stefania Arioli

Tutor per la mobilità internazionale e l'Erasmus:

Prof.ssa Alyssa Mariel Hidalgo Vidal

Course management for the Faculty of Agricultural and Food Sciences (Science and Technology area)

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Degree programme head

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CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

General and specific learning objectives

The bachelor's degree in "Science and Technologies for Sustainable Food" provides knowledge and competences for developing professional skills that allow you to operate in the sectors of production, conservation and distribution of food and beverages, and in sectors related to them.

The structure of the bachelor is functional to a solid preparation for the profession of food technologist in the national and international context, both regarding basic and specific topics. Science and technology for sustainable food production include a series of knowledge and skills concerning the quality of food, environmental and economic sustainability of food

processes, security of supply, food safety and food conservation and protection; graduates in Sustainable Food Science and Technology are prepared for a modern food industry, i.e., strong in terms of production and, at the same time, aware of the importance of food sustainability. The bachelor prepares graduates with a professionalism suitable for maintaining a high level of quality in the activities of small, medium, and large food companies.

The graduate's professional activity also takes place in public and private bodies which carry out analysis, control, certification and surveys for the protection and enhancement of food production. Graduates also express their professionalism in companies related to food production, which supply materials, plants, processing aids, and ingredients. The educational objectives include general aspects of food systems and food sustainability, to allow the graduate to know the entire transformation and conservation process, verifying and improving the quality of food products and by-products through the sustainable use of ingredients, additives, processing aids and optimized technologies for food processing and packaging.

Expected learning outcomes

Expected learning outcomes

Knowledge and understanding

The expected training results will be acquired through a path which, starting from the basic subjects, then continues with the characterizing and related ones, through diversified methods: lectures, classroom exercises, laboratory exercises, field trips, participation in seminars and interdisciplinary training activities using student-centered teaching methodologies and external experts. Graduates in Sustainable Food Science and Technology will be able to know and understand:

- the biological, chemical, biochemical and physical aspects involved in food transformation and conservation processes, also using the acquired mathematical skills;
- the main raw materials of animal and vegetable origin in relation to their role in the food sector;
- the main aspects of cellular metabolism and the methods of its regulation, also with reference to their significance for human nutrition and microbiology;
- the role of microorganisms in food fermentations;
- the role of food-associated microorganisms for the assessment of hygiene and microbiological quality along the food production and distribution chain;
- the role of the agents and causes of infestation of foodstuffs and the methods necessary for the application of integrated controls;
- unit operations of food technology in terms of phenomenology, material balances, energy balances and kinetics; - the main processes of food technology in terms of raw material requirements, process diagrams, material flows, functional schemes of plants and optimization criteria;
- the basic aspects of food sustainability;
- the methods for assessing the food and functional suitability of materials that will come into contact with food during their preparation, distribution and storage;
- the main methods of food analysis and related regulatory references;
- food sensory evaluation methods;
- the concepts of quality, risk analysis, guarantee and certification and related regulatory references;
- the basic methods of food process management and product traceability;
- the principles of economics and marketing related to food businesses.

The expected results of knowledge and understanding are achieved and verified with basic training activities (disciplinary fields of mathematical, physical, chemical, biochemical, and biological sciences) and specific training activities (disciplinary fields of food technologies, safety and assessment of maintenance and economic and legal disciplines), as well as related and supplementary training activities.

Applying knowledge and understanding

The graduate in Sustainable Food Science and Technology will be able to analyze and solve practical problems related to food quality, relative to ingredients, additives, processing aids, packaging materials and applied technology in the entire food chain, from transformation of raw materials obtained from primary production to the distribution of finished products. He will also be able to collaborate on food and food technology innovation and development projects in response to the challenges posed by the Sustainable Development Goals. Graduates in Sustainable Food Science and Technology are able to apply their knowledge to practical aspects of food science and technology, also thanks to the interdisciplinary approach of the course of study; in particular, there are both theoretical and practical courses, provided by teachers from various disciplinary areas, based on the so-called object-based learning (OBL), particularly suited for the food sector. The teaching will be based on the proposal of food raw materials and products of their transformation seen as "objects" to be analyzed and studied from different points of view (chemical, biochemical, microbiological, technological, economic) The student also develops the ability to apply knowledge and understanding through the internship period in the laboratories of the University or in agro-food companies, institutions, public or private specialized laboratories. The verification of the ability to apply knowledge and understanding will be assessed with practical tests carried out in laboratories, in courses that include the study and resolution of specific and general practical problems, in the evaluation of the internship training path and in the context of the discussion of the final manuscript.

Making judgments

At the end of the studies, the graduate possesses an awareness for making judgments that allow him/her to acquire the information necessary to implement interventions aimed at improving the quality, efficiency and sustainability of food production, as well as the ability to evaluate the implications of food technologies in a productive and market context. The tools used to ensure the acquisition of independent judgment include the active involvement of students during the lessons using traditional and blended learning approaches. The ability of making judgements will be verified during the lessons by carrying out theoretical-practical activities, evaluating the ability to organize experimental activities, laboratory analyses, collection and processing of results obtained, scientific reports and thematic debates on current issues in the field of food technologies. Similarly, the same criteria will be used to evaluate the ability of making judgements during the internship activities.

Communication skills

This bachelor prepares graduates with the ability to work in interdisciplinary teams and use a technical-scientific lexicon pertinent to the food production sectors; the graduate will be able to communicate aspects relating to their work to specialists and non-specialists, also using a foreign language of the European Union other than your own, usually English.

The presence of interdisciplinary laboratories allows the development of communication skills capable of spanning the various areas of the essential disciplines of food science and technology. Graduates in Sustainable Food Science and Technology also develop specific skills to prepare reports and technical documents appropriately. Communication skills are acquired both through the activities envisaged by the individual disciplines (thesis, reports, presentations) and during the internship. The communication ability is first verified during the exams of the various course units and, subsequently, during the final degree exam by assessing the ability to use the correct scientific communication tools.

Learning skills

The bachelor provides the cognitive tools essential for a critical, creative, communicative, and collaborative approach to problem solving and continuous updating of knowledge in the various sectors of food science and technology. This approach is achieved through the analysis of case studies and real problems in the food technology sector. The verification of learning ability is carried out by evaluating how the student can deepen and update the knowledge acquired during study, also through the consultation of bibliographic material, databases, and other basic cognitive tools, when faced with problems to solve. This verification takes place when students are invited to in-depth studies on specific topics and during the internship activities-

Professional profile and employment opportunities

Professional profile and employment opportunities

Food production technician function in a work context: The functions of the graduate in Science and Technology for Sustainable Food include: a) planning and control of food production and processing lines, procurement of raw materials and ancillary materials and distribution of finished products; b) use of suitable tools for quality management and traceability according to ISO standards and other specific standards for the food sector; the realization of audits at companies involved in various points of the food chain; the management of alert situations, product recalls and withdrawals from the market; c) participation in research projects for the development of processes and products in the food sector and the improvement of the sustainability of the agro-food supply chains; d) the definition of safety and quality standards and specifications for raw materials, finished products, additives, processing aids, packaging and systems in compliance with current regulations; e) analysis of finished products, raw materials and materials used in the food sector; f) data processing and drafting of technical reports; g) staff training on food safety.

Graduates in Science and Technologies for Sustainable Food can be employed both in small, medium and large enterprises and in Public Bodies) with technical tasks of production, analysis and consultancy, quality control, sustainability in relation to the development and management of production processes and food preservation. Graduates in Sustainable Food Sciences and Technologies also carry out technical tasks of planning and control at various points of the food chain, in companies that carry out production, conservation, distribution of food and beverages and in related companies that supply materials, plants, processing aids, ingredients and services (analysis laboratories or certification bodies). skills associated with the function: The profile of the graduate in Science and Technology for Sustainable Food brings together different skills by integrating knowledge of biology, chemistry, microbiology, economics, and technology in the agro-food system and, as such, can cover different functions in the food industry and in related productions. Graduates in Sustainable Food Sciences and Technologies have the logical and cognitive tools to: a) intervene in the main operations and transformation processes of the food industry and in the combination of production process/product quality; b) develop investigation methods typical of food science and technology, aimed at the development and control of foods and related materials, in relation to consumer needs and the need to improve the sustainability of agro-food chains; c) apply chemical, microbiological and sensorial analytical techniques in the food field. employment opportunities: The professional opportunities for the three-year graduate in Science and Technology for Sustainable Food are: a) in companies which, at different levels, deal with the production, transformation, conservation and distribution of food products; b) in companies related to the production of food supplying plants, ingredients, processing aids and additives, packaging materials; c) in public and private entities that carry out analysis,

control, certification and surveys for the protection and enhancement of food production. Graduates in Food Science and Technology can continue the training path to obtain the Master's Degrees

Initial knowledge required

Initial knowledge required

Qualifications and knowledge required for admission

To be admitted to bachelor's degree in "Science and Technologies for Sustainable Food", you must have a secondary school diploma or other qualification obtained abroad and recognized as suitable. Basic knowledge of mathematics, general chemistry, physics, cell biology, and logic skills are a prerequisite. An integration of the knowledge of mathematics obtained in secondary schools other than scientific high school is a fundamental requirement for tackling the course of study.

Methods of verifying knowledge and personal preparation

Access to the course is regulated by a mandatory test, aimed at ascertaining the initial preparation of the students, in terms of minimum knowledge requirements of basic scientific disciplines and understanding of elementary logic. The test is carried out using the TOLC-AV platform (Test OnLine CISIA); the test is provided by various universities and the location of the test is not binding for subsequent enrolment. Details relating to dates, times, places, and methods of carrying out the test and admission requirements will be made available in the notice published on the website www.unimi.it. The access procedures for students from other Degree Courses of the University of Milan, from other Universities or already graduates are disclosed each year in the call for applications available on the University website. The recognition of credits will be carried out by a teaching commission set up by the teaching college.

Admission assessment

Methods of verifying knowledge and personal preparation

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Admission of transfer or graduate students

Transfer students from a degree programme of the University of Milan, or another university, and graduate students will be waived from the test requirement only if admitted to years subsequent to Year I. To this end, they will have to submit a specific request for prior assessment of their academic records using the online service as shown in the call for applications. These candidates must provide a full transcript of records (listing exams, subject areas, credits, grades) and attach the course syllabi. For more details and dates, please refer to the call for applications. Students admitted to the first year must take the test.

Additional learning requirements (OFA) and remedial activities

Additional training obligations (OFA) and methods for recovering Admitted students who have achieved a score lower than or equal to 4 in the mathematics section of the TOLC-AV are assigned additional learning obligations (OFA). The deadline for passing the OFA coincides with the deadline for the exam session of the academic year of enrolment. The OFA can be fulfilled by attending and passing a final test of the alignment course in Mathematics. The OFA can also be fulfilled by passing the Elements of Calculus course included in the study plan by the deadline of the exam session of the academic year of enrolment. In the event of failure to complete the OFA (or failure to pass the Elements of Calculus exam) within the first year of the course, the student is prevented from taking the second- and third-year exams.

Compulsory attendance

Attendance is strongly recommended for all training activities.

Internship criteria

The internship must be carried out under the guidance of a supervisor teacher, who must indicate a second teacher or an external expert for the role of co-supervisor. The supervisor of the degree thesis can only be a professor of the CdS or of the Faculty of Agricultural and Food Sciences. Any type of activity (for example internships in external companies or laboratories) carried out without the consent of a supervisor will have no value for the final exam.

The end-of-course training internship can only be started:

- 1) after having obtained at least 90 CFU,
- 2) after passing all the compulsory exams required in the first year,
- 3) after acquiring the qualification for knowledge of the foreign language.

Degree programme final exams

The final exam awards 3 credits (CFU). Upcoming graduates must comply with the following:

- pass all exams included in the academic plan, for a total of 153 credits, and earn 12 credits for elective activities.
- earn 3 credits for foreign language proficiency;
- earn 3 credits for computer skills;
- complete an internship on campus or in another public or private organization, for a total of 6 credits;
- write a report on the internship.

The final exam consists of the presentation and discussion of the final paper before an examining board. Candidates will present their final paper, highlighting the purpose and findings of their work, and skills learned. The paper can be written and discussed in Italian or English.

Regulations for the awarding of degree marks is posted on the page <https://www.unimi.it/en/education/faculties-and-schools/agricultural-and-food-sciences>

Notes

In order to obtain their degree, students must be proficient in English at a B1 level under the Common European Framework of Reference for Languages (CEFR). This proficiency level may be certified as follows:

- By submitting a language certificate attesting B1 or higher level in English and issued no more than three years before the date of submission. You will find the list of language certificates recognized by the University at: <https://www.unimi.it/en/node/39322>). The certificate must be uploaded during the enrolment procedure, or subsequently to the portal <http://studente.unimi.it/uploadCertificazioniLingue>;
- By taking a placement test offered by the University Language Centre (SLAM) between October and December of the first year. Students who fail the test will be required to take a SLAM course.

The placement test is mandatory for all those who do not hold a valid certificate attesting to B1 or higher level.

Those who have not taken the placement test by the end of December or fail the end-of-course exam six times must obtain the necessary certification privately before graduating.

EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING PROGRAM

The University of Milan supports international mobility by providing its students with the opportunity to spend study and internship periods abroad. It is a unique chance to enrich your educational path in a new exciting environment.

The agreements entered into by the University with over 300 universities from the 27 EU member countries under the European Erasmus+ programme allow regularly enrolled students to carry out part of their studies at one of the partner universities or to undertake internships at companies, training and research centres and other organizations. Similar international mobility opportunities are provided outside Europe, through agreements with a number of prestigious institutions.

Study and internships abroad

The eligibility criteria to study under the Erasmus+ program, the rules for participation and the criteria for students selection are described in a specific call dedicated to the Food Area. Erasmus+ provides mobility opportunities within 40 academic partners, widely distributed in Europe and selected on the basis of their excellence and teaching affinity with the Italian degree. Students can apply to take courses in the following thematic areas: chemistry, biochemistry, food microbiology, food technology processes, human nutrition, quality management and food economics and marketing. The outline of the Erasmus+ study program (learning agreement) is prepared by the student in collaboration with the Italian academic Erasmus+ tutor (Prof. Alyssa Mariel Hidalgo Vidal - alyssa.hidalgovidal@unimi.it). This document is defined after consulting the teaching board of the Italian degree and receiving the official approval of the activities to be performed in the host institution. In case of research activities, a detailed program describing the activities and the duration of the internship must be planned and formally approved by the host institution supervisor and by a member of the Italian teaching board (Italian supervisor). At the end of study period abroad, the Erasmus+ activities (credits and grades) must be certified in a document called transcripts of records that must be approved by the Italian teaching board (Prof. Alyssa Mariel Hidalgo Vidal - alyssa.hidalgovidal@unimi.it). Exam grades are converted according to a pre-defined scale. The bachelor degree in Food Science and Technology is part of the international program Erasmus+ Placement which is finalized to fund mobility of students, to carry out research activities aimed at the preparation of their final thesis in highly qualified host institutions (private and public universities and research centers).

How to participate in Erasmus mobility programs

The students of the University of Milan can participate in mobility programmes, through a public selection procedure.

Ad hoc commissions will evaluate:

Academic career

the candidate's proposed study programme abroad

his/her foreign language proficiency

the reasons behind his/her application

Call for applications and informative meetings

The public selection for Erasmus+ mobility for study generally begins around February each year with the publication of a call for applications specifying destinations and requirements. Regarding the Erasmus+ Mobility for Traineeship, the University of Milan usually publishes two calls a year enabling students to choose a destination defined by an inter-

institutional agreement or to find a traineeship position on their own.

The University organizes informative meetings to illustrate mobility opportunities and rules for participation.

Erasmus+ scholarship

The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which may be supplemented by the University funding for disadvantaged students.

Language courses

Students who pass the selections for mobility programmes can benefit from intensive foreign language courses offered each year by the University Language Centre (SLAM).

<https://www.unimi.it/en/node/8/>

Learn more at <https://www.unimi.it/en/node/274/>

For assistance, please contact:

International Mobility Office

Via Santa Sofia 9 (second floor)

Tel. 02 503 13501-12589-13495-13502

Contacts: InformaStudenti; mobility.out@unimi.it

Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common		
Learning activity	Ects	Sector
Calculus	8	MAT/05
Elements of Chemistry and Physical Chemistry	8	CHIM/02
English assessment B1 (3 ECTS)	3	NN
Fundamentals of Physics	6	FIS/07
Fundamentals of Plant Biology and Yield	10	(5) AGR/19, (5) AGR/13
Introduction to the sustainability of food production	3	AGR/15
Organic Chemistry	6	CHIM/06
Total compulsory credits		44
2nd COURSE YEAR Core/compulsory courses/activities common		
Learning activity	Ects	Sector
Biochemistry	8	BIO/10
Food chemistry and analysis	10	(5) CHIM/10, (5) AGR/15
Fundamentals in chemical and analytical methods	8	(5) CHIM/01, (1) CHIM/02, (2) CHIM/06
Human Nutrition	6	MED/49
Microbiology and Food Microbiology	12	AGR/16
Principles of Food Engineering	12	(6) AGR/15, (6) ING-IND/11
Total compulsory credits		56
3rd COURSE YEAR (available as of academic year 2025/26) Core/compulsory courses/activities common		
Learning activity	Ects	Sector
Firm and Chain Management in The Food Sector	12	AGR/01
Food ingredients and additives for products development	6	AGR/15
Food Processing	9	AGR/15
Food Quality and Traceability in The Supply Chains	6	AGR/15
Interdisciplinary methodologies for food systems	9	(2) BIO/10, (4) AGR/16, (3) AGR/15
Principles of plant pathology and and stored-product pests	6	(3) AGR/11, (3) AGR/12
Sensory Analysis	6	AGR/15
Sustainable packaging principles and technologies	5	AGR/15
Total compulsory credits		59
Further elective courses		
<p>The educational activities chosen by the student must be consistent with the overall educational project and allow the acquisition of 12 credits. The student may choose elective courses (minimum 8 ECTS- maximum 12 ECTS) or other activities (seminars, conferences, courses, or other activities organized by the University or by another institution) up to a maximum of 4 ECTS. In this context, the Academic Board offers cycles of seminars (each corresponding to 2 credits). Elective activities can be undertaken always and exclusively after the favorable opinion of the Academic Board.</p> <p>The table below lists the elective activities proposed by the Academic Board of Sustainable Food Science and Technology. Independently chosen educational activities must be identified in consultation with the study plan tutor and appear in the</p>		

individual study plan which must be prepared by the date established by the Academic Senate and approved by the Academic Board. See also the paragraph Structure of the course - Presentation of the study plan.		
Alcoholic beverage technology	4	AGR/15
Animal morphology and physiology (basic course)	4	VET/01
Biomolecular methodologies	4	BIO/10
Chemistry and technology of flavours	4	AGR/15
Dairy chemistry and technology	4	AGR/15
Food enzymology	4	BIO/10
Health, Safety and Ergonomics in the food industry	4	AGR/09
Nutritional evaluation of foods	4	BIO/09
Sanitation in food processing	4	AGR/15
Soft skills for the food industry <i>Not activated for 2024/2025 academic year</i>	4	AGR/15
Technology of canned fruits and vegetables	4	AGR/15
<i>End of course requirements</i>		
Final exam	3	NN
Stage	6	NN
Total compulsory credits		9

COURSE PROGRESSION REQUIREMENTS

The course contains the following obligatory or advised prerequisites

Learning activity	Prescribed foundation courses	O/S
Food Processing	Principles of Food Engineering	Core/compulsory