Università di Scienze Gastronomiche di Pollenzo
University of Gastronomic Sciences of Pollenzo

Academic Regulation
Undergraduate degree Program
in Food Tech for Ecological Transition
attivato ai sensi del DM 22/10/2004, n. 270

University	University of Gastronomic Sciences
Classe	L/GASTR R – Gastronomic Sciences, Cultures and Policies
Program name in Italian	Tecnologie del Cibo per la Transizione Ecologica
Program name in English	Food Tech for Ecological Transition
Course language	English
Mode of delivery	Conventional inter-university flexible degree program
Program website	https://www.unisg.it

Specific educational objectives and description of the academic program
(also with reference to the Dublin Descriptors)

The educational objectives of the Food Tech for Ecological Transition program fall within two main learning macro-areas: the first relating to technical-engineering disciplines and the second relating to socio-humanistic and ecological disciplines. Each area is further divided into disciplinary fields to ensure the acquisition of technical-scientific, cultural, and transversal knowledge, skills, and competencies fully consistent with the expected graduate profiles.
In particular, the first technical-engineering area includes: a) the field of engineering disciplines; b) the field of core food science disciplines. On the other hand, the socio-humanistic and ecological area includes: a) socio-humanistic disciplines; b) legal-economic and environmental disciplines.
For the field of basic engineering disciplines within the first learning area (technical-engineering), the educational objectives aim to provide methodological and quantitative tools for the analysis of food systems, to introduce elements useful for automation, systemic design of processes and products, and the estimation of environmental impacts. The expected outcomes include:
- ability to address and analyze basic engineering problems related to the food sector and its technologies;
- application of simplified computational methods, also using dedicated software;
- ability to choose and use the most suitable technologies and sensors for studying and solving problems in the field of food tech;
- basic skills in automation and data management in the food context;
- ability to apply concepts of circular economy and smart packaging;
- competence in environmental impact analysis.

For the field of core food science disciplines, the educational objectives aim to provide integrated knowledge of food transformation processes, the chemical composition of foods, and the changes induced by processing and preservation, with a focus on traditional and innovative packaging systems (smart packaging), and methods for analyzing sensory perception and consumer acceptability. The expected outcomes include:
- basic knowledge of the chemical-physical composition of foods and the main transformation phenomena of food matrices;
- basic knowledge of food preservation, processing, and packaging technologies;
- ability to support the design of sustainable food processes and production plants;
- ability to develop and conduct sensory tests to detect consumer acceptability and perception of food products.

For the field of socio-humanistic disciplines within the second learning area (socio-humanistic and ecological), the educational objectives aim to develop a systemic and critical vision of food systems, through understanding social, psychological, communicative, philosophical, and anthropological dynamics. The expected outcomes include:
- ability to analyze and guide the role of technology in cultural and social contexts;
- ability to identify main communication strategies for effective communication about the role of technology in food sustainability and ecological transition;
- ability to analyze social and cultural implications of technological innovations through the development of ethical and reflective awareness.

For the field of legal-economic and environmental disciplines, the educational objectives aim to provide knowledge of the relevant food regulations and institutional structures involved in political and legal decision-making processes, understanding the impact of economic policies, and the role of agro-forestry and marine ecological systems in maintaining biodiversity and promoting more sustainable production approaches. The expected outcomes are:
- knowledge of governance models and sustainable management of food supply chains;
- knowledge of main agro-forestry and marine ecological systems and principles of their preservation and restoration in the context of ecological transition;
- competence in analyzing economic and environmental impacts of technology use for ecological transition;
- ability to interpret regulations and policies related to food, resources, and sustainability in the context of technological change.

These specific educational objectives are reflected in the study program, which is structured into courses and training activities distributed across semesters.

In particular, the first year is dedicated to acquiring the basic knowledge necessary to address more advanced courses in subsequent years. Students will take courses in mathematics, computer science, economics of sustainable development and technological innovation, ecology and environmental transition, mechanics for food systems, food chemistry, technology in cultural and communication processes of food, and English language to provide technical-scientific linguistic knowledge useful for academic research and business communication.

The second year focuses on in-depth study of food technologies, systemic approaches in the utilization of sustainable natural resources, and the study of cognitive mechanisms underlying food choices. Students will take courses in food technology processes, sensory analysis, systemic design and circular economy, electronics and physics, consumer psychology and consumer food behavior, smart packaging, cultural sustainability, and technological change.

The third year is dedicated to the practical application of acquired knowledge and preparation of the final thesis. Students will take courses in technological governance in food systems, taste technology and artificial aesthetics, environmental management of water and energy resources. Internships or laboratory activities are also included in this year of study. In the second and third years, elective courses are offered in two tracks: one technical-engineering and one socio-humanistic-ecological.

Additional training activities such as study trips (field visits) are provided throughout all years. The program concludes with a final thesis, in which the student applies the experience gained over the three years of the degree program, refining skills in data collection, critical analysis, and written work on studied topics and practical experiences.

Knowledge and Understanding

The program aims to train graduates capable of working in the use, management, and support in designing technologies for sustainable food systems, focusing on all stages of the supply chain. Graduates acquire knowledge enabling them to contribute to the dissemination and adoption of innovative solutions, while developing transversal competencies linking different disciplines and perspectives. In

particular, the graduates in Food Tech for Ecological Transition possess basic and advanced knowledge in engineering disciplines, food sciences, socio-cultural aspects influencing consumption, agro-forestry and marine ecological systems, and governance models for sustainability. They understand chemical-physical phenomena underlying food processes and the economic, ecological, legal, and cultural principles regulating supply chains and influencing ecological transition and demonstrate the ability to critically frame technological and social processes from interdisciplinary perspectives. Drawing upon the knowledge acquired through the courses in the scientific-technological area, graduates are able to tackle issues related to the design and implementation of basic technologies, which are preparatory to the study of complex and multidisciplinary fields. At the same time, knowledge in chemistry, food technology processes, and mechanics applied to food systems enables them to understand the main components of food matrices and the key physicochemical phenomena underlying food transformations, as well as the principal techniques for food processing, preservation, and packaging. In addition, the educational curriculum provides tools for analyzing consumer responses through skills in sensory science, consumer psychology, and eating behavior, as well as knowledge related to agro-forestry and marine ecosystems and the principles of their preservation and restoration within a framework of ecological transition. Graduates also develop competencies in circular economy, governance models, and the sustainable management of food supply chains, together with skills in analyzing the economic and environmental impacts resulting from the use of technologies in support of ecological transition. From a socio-humanistic and ecological perspective, graduates acquire the ability to critically interpret cultural changes related to food, understand social dynamics and consumption practices in relation to cultural and territorial factors, and recognize the value of food identities in building sustainable models. From a legal-economic standpoint, they gain knowledge of food and environmental law, as well as national and European regulations governing the production, processing, and distribution of food, in addition to economic and legal tools for promoting responsible innovation and protecting natural resources. The graduate's profile is completed by the ability to understand the role of technologies and the consequences of their use within a broader cultural and social context, to critically reflect on the ethical, social, and cultural implications of innovation, and to use effective communication strategies to enhance the contribution of technology to food sustainability and the ecological transition.

Ability to apply knowledge and understanding

The graduate in Food Tech for Ecological Transition is able to apply technical-scientific, socio-cultural, ecological, economic and legal knowledge to analyze and support the optimization of production processes from a sustainability perspective, to support the design and management of innovative solutions, to interpret regulations and policies on food and the environment, and to develop effective communication strategies for the dissemination of sustainable food practices. They can transfer the knowledge acquired into real contexts through laboratory activities, case studies and interdisciplinary project work. In particular, the program and its syllabus has been designed so that the graduate may carry out the following activities: - support the analysis and optimization of production processes from a sustainability perspective; - contribute to the design of innovative solutions for food products/processes that improve the sustainability of supply chains through technological innovation; assess and manage environmental, social, economic and cultural impacts; - analyze, understand and promote the social, cultural and ethical aspects related to technological innovation in the food sector. These objectives are pursued through the set of academic activities, which combine classroom activities, laboratory activities and field research. In particular, for the purposes of ongoing assessment of the achievement of these objectives, the following academic tools are included in the program: - interactive and dialog-oriented frontal lectures; - discussion activities on case studies and readings previously selected and indicated or provided by the professors; - presentation and discussion of images, graphic materials, and videos; - elective academic activities carried out in small groups; - seminars and round tables; - active participation in debates, meetings and conferences.

The verification of these objectives will be carried out through individual examinations (written or oral depending on the case), reports and laboratory activities that will consider the student's continuous and proactive participation during academic activities. To ensure students can effectively apply their knowledge, the course content incorporate not only theoretical instructions but also a practical/applied component, enabling students to develop the necessary operational know-how to put their learning into practice. The entire Academic curriculum is supported by an e-learning platform—Learning Management System—and by the possibility of delivering teaching in synchronous/asynchronous digital modes through various types of platforms. The Academic curriculum is fully integrated with "Learning Management System", which serves as the primary e-learning platform. Additionally, instructions can be delivered both synchronously and asynchronously using a variety of other platforms. All courses within the program benefit from a dedicated page on the Moodle platform which allows continuous assessment of learning on a daily basis by assigning and grading assignments, as well as group and individual work.

Autonomy in Judgment

The graduate develops critical thinking skills and independent judgment in analyzing the role of technologies and technological innovation in food systems, assessing their ecological-environmental, economic, cultural, social, and ethical implications. They can formulate independent evaluations of the impact of innovations, propose alternative solutions, and contribute to informed decision-making in business, institutional, and territorial contexts. This autonomy of judgment is ensured through a multidisciplinary and systemic approach to issues related to food production, inspired by the principles of durability and sustainability. The autonomy acquired, verified through internship/laboratory activities and the final thesis, is particularly critical for the development of the graduate's capacity for independent behavior and decision-making.

Communication Skills

The course design of the Bachelor's Degree program in Food Tech for Ecological Transition ensures that communication skills are developed through specific educational tools, such as the individual or group presentation—oral or written—of the content of each learning activity. These skills are assessed during classes and evaluated at the end of each course. In addition, the curriculum includes a specific course (Technology for Society and Communication), structured into two modules, which enables students to acquire communication knowledge specific to the food sector, particularly regarding communication and media processes and the main communication strategies, considering the role of food and technology in contemporary society. This knowledge is also useful for the development of the graduate's individual communication skills. The graduate can communicate clearly, effectively, and inclusively information, analyses, and results related to food technologies and sustainability, using language appropriate to different audiences (technical experts, institutions, consumers, and citizens). They demonstrate intercultural communication skills and the ability to use digital, visual, and multimedia tools to promote the dissemination of sustainable practices and the engagement of civil society.

Learning skills

The Bachelor's Degree Program in Food Tech for Ecological Transition equips students with the necessary tools for the continuous updating of knowledge in the specific sector. It offers students structured opportunities for complementary learning (scheduled conferences, meetings and seminars, elective courses), designed to guide students toward addressing the various structural and practical challenges throughout the food supply chain, from production to consumption. This training begins with individual study, is integrated with laboratory experiences that implement "learning by doing," and prioritizes the continual updating and versatility of skills as primary requirement. Graduates can independently update and expand their knowledge, acquiring new technical-scientific, socio-cultural, ecological-legal, and economic

competencies. They can undertake continuing educational opportunities, including second- and third-level degree programs, and are well equipped to adapt to the rapid changes in the agri-food and technological sectors. They also develop the ability to learn from non-formal contexts, through interaction with stakeholders and direct experience in operational situations (field visits). The preparation of the final thesis further offers an additional opportunity for in-depth study and for assessing the communication skills developed.

Professional profile and potential career opportunities for graduates

Research and Development Specialist (Ecological Transition Focus)

Professional functions and skills:
The graduate in Food Tech for Ecological Transition works as a Specialist in the design, operation, management, and promotion of food technologies and technological innovation (Research and Development Specialist – Ecological Transition Focus) within food production and distribution activities, as well as in contexts and organizations that support the development of innovative technologies for the food sector, carrying out the following functions:
- supports the analysis of production processes and their reorganization from a sustainability perspective, with a continuous improvement approach, leveraging the most up-to-date technological innovations;
- supports the development of innovative solutions for the creation of new products/processes through the selection, management, and use of appropriate technologies;
- supports the optimization of the reuse of by-products and waste deriving from food production through the selection, management, and use of appropriate technologies;
- contributes to the design and development of projects and products in the food sector that improve supply chain sustainability through technological innovation;
- analyzes and understands the social, cultural, and ethical aspects related to technological innovation in the food sector, such as workers' rights, social and cultural sustainability, and the impact of food technologies on communities and the environment.

Skills associated with the function:
- analyze and reorganize production processes from a sustainability perspective, introducing continuous improvement approaches and technological innovation;
- support the development and application of innovative solutions for new products and processes, promoting the efficient use of resources and the enhancement of by-products and waste;
- propose technological solutions that combine efficiency, safety, environmental sustainability, and social well-being;
- support the design and management of research and development projects in the food sector, with attention to environmental, economic, and social impacts;
- interpret the social, cultural, legal, and ethical implications of technological innovations in the agri-food sector.

Career opportunities:
- Companies operating in the production, processing, and preservation of food products (R&D and quality control).
- Companies operating in logistics and distribution within the agri-food sector.
- Companies involved in the development of machines, plants, systems, and technologies used in the agri-food sector.

- Organizations involved in designing food policies aimed at promoting sustainable technological innovation at various levels (local, national, and international).
- Private and public entities conducting activities related to the assessment of environmental, social, economic, and cultural impacts of agri-food production.
- Strategic consultant for food companies.
- Start-ups or entrepreneurial ventures.

Admission requirements

The Undergraduate Program in Food Tech for Ecological Transition has limited enrollment and includes an admission test aimed at selecting the most qualified candidates based on criteria related to:
1. Basic scientific and cultural knowledge demonstrating an aptitude for multidisciplinarity applied to the study of food systems and sustainable technological innovation, derived from the quality of the candidate's educational background and the richness of their extracurricular experiences (such as work experiences relevant to food sciences, activities demonstrating an interest and curiosity for technological innovation and sustainability, participation in optional experimental school activities, volunteering experiences, periods of study/work abroad, etc.);
2.The ability to establish coherent logical connections between the candidate's previous educational or professional backgrounds and the studies they intend to undertake;
3. The ability to communicate clearly and accurately in English, showing a strong grasp of language rules along with logical reasoning and argumentation skills, especially with regard to topics within the broad area of food.
To be admitted to the Undergraduate Degree Program in Food Tech for Ecological Transition, candidates must hold a secondary school diploma (upper secondary education) or another qualification obtained abroad and recognized as suitable. The program does not require specific prior subject knowledge; however, a minimum level of English proficiency equivalent to B2, as defined by the Common European Framework of Reference for Languages (CEFR), is required.
If a candidate is admitted but does not reach this level of English proficiency during the admission test, they will be assigned additional learning requirements (O.F.A.) to be completed during the first year of the program, aimed at addressing the gaps identified during the test, in accordance with the academic regulations of the degree program.

Methods for fulfilling additional learning requirements (O.F.A.)
If a candidate is admitted but does not achieve the required level of English proficiency during the admission test, they will be assigned additional learning requirements (O.F.A.), such as reading materials or completing exercises designed to enhance their English expression skills. These requirements must be completed within the first year of the program and are intended to address the deficiencies identified during the admission test.

Tuning Matrix
Macro area of technical-engineering– Engineering field
Knowledge and understanding

The training within the technical-engineering macro learning area, specifically in the engineering field, provides students with foundational knowledge in mathematics, physics, chemistry, and computer science that is essential for engineering disciplines. It is particularly necessary for understanding phenomena in the food and food technology sectors.
Graduates will possess knowledge and understanding of:
- the fundamental elements of mathematics and statistics;
- the analysis of physical phenomena and quantities, and the interpretation of data;
- the properties and structure of matter, organic and inorganic compounds, and chemical phenomena of relevance to the food sector;
- methodological and operational aspects of computer science and programming.

Ability to apply knowledge and understanding
At the end of the Curriculum, graduates are expected to be able to apply mathematical and statistical methods to analyze issues related to food, interpret physical and chemical phenomena within the food supply chain and use the laws governing them, solve practical problems through simple programs implemented in a programming language, and handle spatial data analysis technologies as well as satellite techniques for land acquisition and management.

Macro-area of technical-engineering– Food science field

Knowledge and understanding
The training within the macro-area of technical-engineering related to the field of food sciences provides students with:
- basic knowledge of the main constituents (macro- and micronutrients) of food and of the principal
- chemical-physical phenomena underlying food transformations;
- basic knowledge of the main food processing and preservation methods;
- basic knowledge of food packaging technologies;
- knowledge of sensory science and consumer science.

Ability to apply knowledge and understanding
At the end of the educational pathway, graduates will be able to apply this knowledge to analyze food processing operations in real-world contexts and support the management of production processes, identifying the most suitable technologies to ensure product quality and sustainability. They will also be capable of using methodological tools to assess the effectiveness of different preservation and packaging techniques, integrating the results of sensory evaluations with technological and nutritional data, and supporting the development of innovative solutions that meet consumer needs from an ecological transition perspective.

Macro-area of Socio-humanistic and ecological disciplines – Socio-humanistic field

Knowledge and understanding
The training within the macro-area of socio-humanistic and ecological disciplines, specifically in the socio-humanistic field, provides students with the following knowledge:
- knowledge of the main social, communicative, and media processes, with particular attention to the role of food and technology in contemporary society;
- understanding of the main communication strategies aimed at effectively and inclusively promoting the role of technology in food sustainability and ecological transition;
- the ability to critically analyze social dynamics and the ethical and cultural implications arising from the introduction of technological innovations in the agri-food sector and in consumption patterns;
- basic knowledge of the psychology of eating behaviors, with reference to the cognitive processes underlying food choices and consumption dynamics;

- awareness of the interactions between cultural, ethical, ecological sustainability dimensions and food practices.

Ability to apply knowledge and understanding
At the end of the Degree program, the student will be able to interpret and contextualize the role of technology within the complex cultural and social framework, highlighting both opportunities and critical issues. Furthermore, they will be able to apply communication tools and strategies for the dissemination of practices and technological innovations related to sustainability, and to assess the social and cultural impacts of technological transformations, proposing appropriate solutions and communication approaches. Psychological, sociological, ethical, and cultural knowledge will be integrated for the design of interventions, initiatives, or products that promote sustainable eating behaviors. Finally, graduates will be able to collaborate in interdisciplinary contexts to translate technical-scientific knowledge into accessible and culturally sensitive language.

Macro-area of socio-humanistic and ecological disciplines – Legal, economic, and environmental field

Knowledge and understanding
- knowledge of governance models and sustainable management tools for food supply chains, including from a global and comparative perspective;
- knowledge of the main agro-forestry and marine ecological systems and the principles for their preservation and regeneration, with particular reference to the challenges of ecological transition;
- knowledge and understanding of the main legal disciplines and European and national policies regarding food, the environment, natural resources, and technological innovation;
- knowledge of the economic dynamics linked to sustainable development, with particular focus on agri-food markets and their role in promoting technological innovation for sustainable development;
- awareness of environmental risks and strategies for mitigation and adaptation related to the use of technologies in the agri-food sector.

Ability to apply knowledge and understanding
At the end of the program, the student will be able to engage with legal systems and public policies concerning food, the environment, and natural resources, placing them within the context of technological change and ecological transition. Graduates will also be able to analyze and evaluate the economic, social, and environmental impacts of technological innovations in agri-food supply chains and use legal and economic tools to promote sustainable models of food production, distribution, and consumption. Furthermore, by integrating ecological and legal knowledge, they will be able to propose governance solutions aimed at enhancing the resilience of agri-food systems. Finally, graduates will be capable of collaborating in interdisciplinary contexts to define sustainability strategies at the company, territorial, and institutional/regulatory levels.

Characteristics of the final examination

The Undergraduate Degree in Food Tech for Ecological Transition is awarded upon passing a final examination, consisting of the preparation of an original thesis. The final examination is conducted in English. The thesis is based on the knowledge acquired in the disciplinary fields developed throughout the course of study, which can be integrated and supplemented with experiences gained during the educational program. The final examination aims to assess the student's individual ability to integrate the knowledge acquired across the various courses. The procedures for assignment and completion of the final examination are specified in the relevant University regulations.