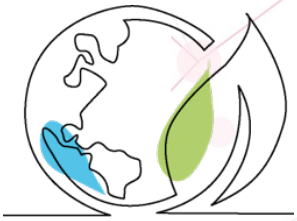
Sustainable Food Systems



Explore this IDIL Master's track in detail, including its academic objectives, curriculum, research opportunities, admission requirements and career prospects.

TRACK OVERVIEW & LEARNING OBJECTIVES

The **Sustainable Food Systems** Master's program offers research-driven training at the intersection of **food science, food engineering, and food systems**, guided by the holistic principles of **One Health**, which recognize the interdependence of human, animal, and environmental health.

Addressing Global Food Challenges - Food systems are facing unprecedented challenges that are expected to intensify over the coming decades. Increasing pressure on land, water and natural resources, the emergence of global pandemics, climate change, population displacement, and geopolitical instability are all contributing to growing disruptions across food supply chains worldwide. With the world's population expected to exceed 9 billion by 2050, **ensuring access to safe, nutritious, affordable, and sustainable food has become one of the greatest scientific and societal challenges of our time.**

Building resilient food systems, reducing food loss and waste and rethinking food production within a broader framework of sustainability, health, and environmental stewardship have become global priorities.

An International Master's at the Heart of the Mediterranean region – Based in one of the areas the most vulnerable to climate change and characterized by strong demographic growth, social transitions, and recurring geopolitical tensions this Master's program provides a unique learning environment to study the complex interactions between food, agriculture, health, and the environment. Students will develop the scientific knowledge and interdisciplinary skills to become the next generation of scientists and innovators capable of designing food systems that are more sustainable, resilient, safe, and respectful of both planetary boundaries and human well-being.

Research-Based and Personalized Training - The program is closely connected to internationally recognized research laboratories, allowing students to engage with cutting-edge scientific developments throughout their studies. To support each student's ambitions and career goals, an individualized academic pathway is

developed at the start of the Master's program through close collaboration between the student, faculty members, and a research team. This personalized approach enables students to build expertise in specific areas of **food science and food engineering**, while benefiting from strong integration with cutting-edge research.

KNOWLEDGE, SKILLS & COMPETENCIES

KNOWLEDGE

General knowledge of the food chain and its interdependency with agricultural production and the medical sector.
The 'One Health' concept.
The determinants of food quality.
The basics of microbiology and food chemistry.
The basics of process engineering.
Fundamentals of Risk Assessment
Understanding the determinants of nutritional value and the health effects of dietary patterns
Advanced knowledge of the relationship between process and functional properties.
The basics of food packaging.
The principles of food sustainability.

SKILLS

- Methodology :
  - Assessment of food chemistry (standard and new rapid methods) and food microbiology (Pasteurian and advanced, genomic-based techniques).
  - Heat/mass transfer calculations.
  - Packaging dimensioning tools.
  - Approaches and methodologies for chemical risk assessment and nutritional quality control
  - Exploring methods for assessing the environmental impacts of agricultural and agri-food systems
  - Introduction to life cycle analysis and calculation of carbon and plastic footprints
  - Data collection, processing and sorting.
  - Building a project proposal in response to a call for proposals
  - Designing and conducting an experimental plan in a research laboratory

RESEARCH ORIENTED SKILLS

- Mobilize disciplinary knowledge in a multidisciplinary context and international environment

- Develop effective communication skills to work collaboratively with people from other disciplines
- Develop critical thinking and ethical awareness based on evidence from different disciplines.
- Participate in the synthesis of data from research projects in a multidisciplinary context.

INTERPERSONAL SKILLS

- Team working and collaboration
- Time management, task planning and coordination
- The autonomy to carry out activities independently within a research laboratory
- Confidence in expressing and presenting results (both orally and in writing)
- Self-confidence

& OTHER SKILLS DEVELOPED

DETAILED CURRICULUM

Semester 1 (S7)
The food chain: technologies, actors, and society (3 ECTS)
Applied microbiology, biodetection, biotracability (3 ECTS)
Applied process engineering (3 ECTS)
Functionalities and characteristics of biomolecules (3 ECTS)
In-Lab (workshops and practical exercises) (2 ECTS)
Research-oriented personal project (10 ECTS)
Transversal training unit 1B (Methodological and Professional Skills Courses) (2 ECTS)
Non-Core Units (Exposure to Other Disciplines to be selected in a catalog) (4 ECTS)

Semester 2 (S8)
M1 Research Internship in Food-Science (30 ECTS)

Semester 3 (S9)
Process optimization and advanced simulation tools (2 ECTS
Food system Sustainability and Environmental Nexus (3 ECTS)
Food packaging: tools for eco-design (2 ECTS)
Ensuring nutritional quality and safeguarding consumer health (3 ECTS)
Applications of AI in Process Engineering (2ECTS)
Multidisciplinary team project (10 ECTS)
Transversal training unit 2B (2 ECTS)
Non-Core Units to be selected in the catalogue (4 ECTS)
In-lab Experimental approaches (2 ECTS)

Semester 4 (S10)
M2 Research Internship in Food-Science (30 ECTS)

Non-Core:
Examples of Non-core in the IDIL catalogue
Mediterranean Ecosystems
Challenges in chemistry for health & environment
Scientific openness to earth and water issues under global change
One health and eco-epidemiology
The Bionic Man
Sustainable management basics
Shaping the Future of Agriculture
Challenges in chemistry for health and environment
And more

In-Labs :
Examples of In-Labs
Assessment of microplastics, emerging contaminants in the food chain
Energy optimisation of wheat milling
Pasta production: the impact of the manufacturing process on nutritional properties
AI in the decision-making process : example of packaging design

ADMISSION REQUIREMENTS & STUDENT PROFILE

Admission Requirements

Mandatory prerequisites

This selective interdisciplinary program is open to students with a bachelor's degree in food science, , chemistry and biochemistry, biotechnology or in process engineering with high interest in food applications. In any case, students must demonstrate a strong interest in both food science AND food process engineering.

Knowledge of **applied physics** and **mathematics** is highly desirable. As the program is taught in an international scientific environment, a good command of **scientific English** is essential. Successful candidates will also demonstrate autonomy, intellectual curiosity, and the ability to work effectively within multidisciplinary teams.

Admission requirements:

• Bachelor's degree or equivalent in the field of study

• Minimum English level B2

• CV and cover letter

• Estimated ranking of the student in their class

• Explanatory transcript

Following the first stage of the application process, if the selection criteria are met, a remote interview will be organised between the applicant and the Master's degree programme leader.

Registration procedures:

First, please contact the program director for the Master's degree you are interested in to obtain information about the expected level and type of instruction offered.

- French & European students:
  - For the M1, follow the "My Master's Degree" procedure on the website: https://www.monmaster.gouv.fr/
  - For M2 students, applicants must submit their application via the e-candidat application: https://candidature.umontpellier.fr/candidature

International students from outside the EU: follow the "Études en France" procedure: https://pastel.diplomatie.gouv.fr/etudesenfrance/dyn/public/authentification/login.html

CAREER OPPORTUNITIES

Academic:
Higher education researcher or lecturer-researcher. The ideal background for pursuing a PhD in food science, biomaterials, biotechnology, process engineering, environmental engineering and One Health approaches in the agri-food sector, applied to the food supply chain.
Possibility to specialise in biology and health.

Private sector:
Possibility of being recruited by large groups or companies, as well as SMEs, laboratories, consultancy firms, associations, cooperatives, etc., as a junior researcher, R&D project manager, young scientist, auditor, etc.

For positions in:
- R&D Scientist / Research Scientist
- Research Project Manager
- Innovation Manager
- Regulatory Affairs Specialist
- Coordinator of Collective Scientific Expertise
- Food Safety / Quality Consultant
- Eco-design and Sustainability Specialist / Manager

RESEARCH LABORATORIES & ACADEMIC PARTNERS

Involvement of Montpellier I-Site laboratories in agri-sciences and related fields.

- Institut Agro Montpellier (https://www.institut-agro-montpellier.fr)
- INRAE Montpellier (https://www.inrae.fr/centres/occitanie-montpellier)
- CIRAD Montpellier (https://www.cirad.fr/dans-le-monde/nos-directions-regionales/montpellier-occitanie)

National and international networks of associated laboratories, such as LIA BIOMATA : International Associated Laboratory (LIA) for biobased products with the Scion institute in New Zealand

Contact

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For more information: https://idil.edu.umontpellier.fr/en/master-idil/les-parcours/