

Livret de formation

Programme 2025 - 2026

Programme

Semestre 3

Master 2 Microbiology and Physicochemistry for Food and Wine Processes - M2 MP2

Unité d'enseignement	Module	Heures étudiant	Coefficient
D-M2-MP2-S3-ATC-UE01 - PROFESSIONNAL SKILLS	Business world and entrepreneurship	8	0
	Advanced analysis	8	1
	Ethic and deontology	10	0
	Project Management	12	0
	Project	48	5
D-M2-MP2-S3-MI-UE02 - MICROBIOLOGY APPLIED TO FOOD SAFETY	Microbiology applied to food safety	50	6
D-M2-MP2-S3-PH-UE02 - CHEMICAL AND PHYSICAL FOOD AND WINE ANALYSIS	CHEMICAL AND PHYSICAL FOOD AND WINE ANALYSIS	41	6
D-M2-MP2-S3-MI-UE03 - INTERACTIONS AND ADAPTATIONS OF MICROORGANISMS TO THEIR ENVIRONNEMENTS	Interactions and adaptation of micro-organisms to their environnements	31	6
D-M2-MP2-S3-PH-UE03 - FOOD AND WINE STABILITY	FOOD AND WINE STABILITY	40	6
D-M2-MP2-S3-MI-UE04 - FOOD AND WINE DESIGN BY THE MEAN OF MICROBIOLOGY	Food and wine design by the mean of microbiology	34	6
D-M2-MP2-S3-PH-UE04 - FOOD AND WINE DESIGN BY THE MEAN OF PHYSICAL CHEMISTRY	Food and wine design by the mean of physical chemistry	39	6
D-M2-MP2-S3-PH-UE05 - CHEMISTRY AND TOXICOLOGY APPLIED TO FOOD SAFETY	Chemistry and toxicology applied to food safety	35	6
D-M2-MP2-S3-MI-UE05 - FOOD PROCESSES AND EMERGING TECHNOLOGIES	Food processes and emerging technologies	40	6
Total		396	

D-M2-MP2-S3-ATC-UE01 : PROFESSIONNAL SKILLS
Module Obligatoire

D-M2-MP2-S3-TC-UE01-M01

Business world and entrepreneurship

Nb heures / étudiant	8				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	-	8	-	-	-
Nb groupes	-	1	-	-	-
Enseignants responsables	Elias BOU MAROUN, Stephane GUYOT				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences					
Objectifs Développement Durable	Consommation et production responsables				
Intervenants Internes	Laurence DUJOURDY, Walid HORRIGUE				
Objectifs du module					
Objectifs d'apprentissage					
Pré-requis					
Contenu					
Évaluations	CC : attestation de présence				
Coefficient	-				

D-M2-MP2-S3-ATC-UE01 : PROFESSIONNAL SKILLS

Module Obligatoire

D-M2-MP2-S3-TC-UE01-M02

Advanced analysis

Nb heures / étudiant	8				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	-	8	-	-	-
Nb groupes	-	1	-	-	-
Enseignants responsables	Elias BOU MAROUN				
Département/UPé	AGRONOMIE, AGROEQUIPEMENTS, ELEVAGE, ENVIRONNEMENT				
Compétences					
Objectifs Developpement Durable					
Objectifs du module					
Objectifs d'apprentissage					
Pré-requis					
Contenu					
Évaluations	Examen Ecrit	Examen Oral	Contrôle Continu Oral	Ecrit individuel	
Coefficient	-	-	-	-	

D-M2-MP2-S3-ATC-UE01 : PROFESSIONNAL SKILLS

Module Obligatoire

D-M2-MP2-S3-TC-UE01-M03

Ethic and deontology

Nb heures / étudiant	10				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	-	10	-	-	-
Nb groupes	-	1	-	-	-
Enseignants responsables					
Département/UPé	AGRONOMIE, AGROEQUIPEMENTS, ELEVAGE, ENVIRONNEMENT				
Compétences					
Objectifs Developpement Durable					
Objectifs du module					
Objectifs d'apprentissage					
Pré-requis					
Contenu					
Évaluations	CC : attestation de présence				
Coefficient	-				

D-M2-MP2-S3-ATC-UE01 : PROFESSIONNAL SKILLS

Module Obligatoire

D-M2-MP2-S3-TC-UE01-M04

Project Management

Nb heures / étudiant	12				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	12	-	-	-	-
Nb groupes	1	-	-	-	-
Enseignants responsables	Elias BOU MAROUN				
Département/UPé					
Compétences					
Objectifs Developpement Durable					
Objectifs du module					
Objectifs d'apprentissage					
Pré-requis					
Contenu					
Évaluations	CC : attestation de présence				
Coefficient	-				

D-M2-MP2-S3-ATC-UE01 : PROFESSIONNAL SKILLS

Module Obligatoire

D-M2-MP2-S3-TC-UE01-M05

Project

Nb heures / étudiant	48				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	-	48	-	-	-
Nb groupes	-	1	-	-	-
Enseignants responsables	Elias BOU MAROUN, Stephane GUYOT				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences					
Objectifs Développement Durable	Consommation et production responsables				
Intervenants Internes	Elias BOU MAROUN, Stephane GUYOT				
Objectifs du module	The students are required to lead a group or individual project that includes conducting a literature search and an experimental component. This project is sponsored by academic or industrial research partners. The objectives of this supervised project are to apply the knowledge of project management, experimental planning, databases, and data analysis. Group collaboration aims to enhance students' understanding of teamwork dynamics. Projects will predominantly take place in the master's laboratories and utilize their associated platforms, providing students with operational insights into these facilities. For dual engineering/M2 students, this project replaces the project C in their engineering education curriculum. The project culminates in a written report and two presentations (one at the beginning and one at the end), both conducted in English.				
Objectifs d'apprentissage					
Pré-requis					
Contenu	This teaching unit involves 9 to 10 weeks of work under a research project supervised by an academic or industrial partner. This unit represents a small research project where students work alone or within a group to conduct: - Bibliographic search - State of the art presentation - Lab experiments - Data treatment - Statistics courses - Report writing - Final oral presentation of their work in the form of a poster				
Évaluations	CC : compte-rendu ou rapport écrit en groupe				
Coefficient	5				

D-M2-MP2-S3-MI-UE02 : MICROBIOLOGY APPLIED TO FOOD SAFETY
Module Obligatoire

D-M2-MP2-S3-MI-UE02-M01

Microbiology applied to food safety

Nb heures / étudiant	50				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	21	10	19	-	-
Nb groupes	1	1	1	-	-

Enseignants responsables	Stephane GUYOT, Elias BOU MAROUN, Laurent GAL, Helene LICANDRO
Département/UPé	SCIENCES ALIMENTS-NUTRITION
Compétences	
Objectifs Développement Durable	Consommation et production responsables

Intervenants Internes	Laurent GAL, Remy CACHON, Helene LICANDRO, Yves WACHE
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Objectifs du module	The objective of this unit is to provide knowledge on pathogenic microorganisms and ways of controlling their development. Emphasis is placed on research-based training through article analysis, design and implementation of experimental work to apply the different strategies identified in progress.
Objectifs d'apprentissage	
Pré-requis	Basis knowledge in foodborne pathogens: identificatin, virulence mechanisms and pathogen/food matrix pairing
Contenu	<i>L. monocytogenes</i> : virulence, response to environment Prediction of pathogen growth as a function of atmosphere composition Soil microbiology + antibioresistance Analysis of microbial physiology by the mean of the flow cytometry Bacteria-Human Norovirus interaction Predictive microbiology (Sym'Previus, growth and death) spoilage microorganisms in wine Development of a scientific approach to a elucidate a question related to pathogenicity (practicals)

Évaluations	CT : écrit individuel	CC : compte-rendu ou rapport écrit en groupe
Coefficient	4	2

D-M2-MP2-S3-PH-UE02 : CHEMICAL AND PHYSICAL FOOD AND WINE ANALYSIS
Module Obligatoire

D-M2-MP2-S3-PH-UE02-M01

CHEMICAL AND PHYSICAL FOOD AND WINE ANALYSIS

Nb heures / étudiant	41				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	9	16	16	-	-
Nb groupes	1	1	-	-	-
Enseignants responsables	Stephane GUYOT, Elias BOU MAROUN				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences					
Objectifs Développement Durable	Consommation et production responsables				
Objectifs du module	The objective of this teaching unit is to provide students with comprehensive knowledge and practical skills in food and wine analysis. Through a combination of lectures, tutorials, and practical sessions, students will learn various analytical techniques used to assess the composition, quality, authenticity, and safety of food and wine. The course covers fundamental principles, sample preparation methods, advanced instrumentation (such as LC-MS, GC-MS, spectroscopy, Dielectric- RPE, and NMR), and the interpretation of analytical data. By the end of the unit, students will be equipped to apply these techniques in real-world scenarios, contributing to the enhancement of food and wine quality control and fraud detection.				
Objectifs d'apprentissage					
Pré-requis					
Contenu	Lecture 1. Intro to Food Analysis. Lecture 2. Intro to Wine Analysis. Lecture 3. Examples of food and wine analysis. Lecture 4. Biophysics of proteins. Tutorails 1 & 2. Sample preparation. Tutorial 3. LC- MS: applied to wine metabolimics. Tutorial 4. GC-MS-olfactometry: applied to aroma coumpounds. Tutorial 5. Spectroscopies applied to wine composition and authenticity (AAS, IR, Fluo, ICP). Tutorial 6. (2h) Debriefing Practical, statistics. Tutorials 7 & 8. Dielectric- RPE, DMTA, NMR to study relaxation phenomenon. Tutorial 9. Debriefing Practical. Parctical 1: Fraud detection (application to wine): samples preparations, main compounds or traces. Practical 2: Physical chemical characterizations (physical state, interfacial structure, scattering)				
Évaluations	CT : écrit individuel		CC : oral en groupe		
Coefficient	4		2		

D-M2-MP2-S3-MI-UE03 : INTERACTIONS AND ADAPTATIONS OF MICROORGANISMS TO THEIR
ENVIRONNEMENTS
Module Obligatoire

D-M2-MP2-S3-MI-UE03-M01

Interactions and adaptation of micro-organisms to their environments

Nb heures / étudiant	31				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	21	2	8	-	-
Nb groupes	1	1	1	-	-
Enseignants responsables	Elias BOU MAROUN, Stephane GUYOT				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences	A venir pour les formations autres qu'ingénieurs				
Objectifs Développement Durable	Consommation et production responsables				
Intervenants Internes	Pascale WINCKLER, Helene LICANDRO				
Objectifs du module	The skills acquired in this teaching unit concern on the one hand the techniques of large-scale study of different microbial species and on the other hand the knowledge of different microbial species (food, human and environmental) and their functions and evolutions according to environmental conditions.				
Objectifs d'apprentissage	Known how bacteria, fungi and virus behavior is impacted by their environments. Environnements considered: soil, foods and human gut. Get basis in food virology				
Pré-requis	Basis knowledge in food microbiology				
Contenu	Sequencing technologies to study the microbiota The human intestinal microbiota Oral Microbiota Study of microbiota for environmental purposes Pesticide soil ecotoxicology / bioremediation Basics in virology and food virology New technologies in food virology (detection of viruses in foods) Impact of different processes (heat) and cleaning procedures (chemicals) on MS2 phage (PFU vs PCR)				
Évaluations	CC : écrit individuel		CT : écrit individuel		
Coefficient	2		4		

D-M2-MP2-S3-PH-UE03 : FOOD AND WINE STABILITY
Module Obligatoire

D-M2-MP2-S3-PH-UE03-M01
FOOD AND WINE STABILITY

Nb heures / étudiant	40				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	10	14	16	-	-
Nb groupes	1	1	1	-	-
Enseignants responsables	Stephane GUYOT, Elias BOU MAROUN				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences					
Objectifs Développement Durable	Consommation et production responsables				
Objectifs du module	The objective of this teaching unit is to equip students with advanced knowledge and practical expertise in contemporary challenges and innovations in food packaging, wine stability, and the encapsulation of food components. The unit covers trends in food packaging, techniques for stabilizing and analyzing wine, and methods for encapsulating food components to control their release and improve their stability. Through lectures, tutorials, and practical sessions, students will explore case studies, analyze scientific articles, and engage in hands-on experiments. By the end of the unit, students will be proficient in predicting shelf life, understanding new technologies for preventing food degradation, and evaluating the properties of food packaging and wine fining techniques.				
Objectifs d'apprentissage					
Pré-requis					
Contenu	Lecture 1: Trends in food packaging. Lecture 2&3: Wine Stability and analysis. Lecture 4: Encapsulation of food components to stabilize and target- Control release. Tutorial 1: Wine stability -articles study. Tutorial 2: Encapsulation articles study. Tutorial 3: Food packaging and shelf life. Tutorial 4: Shelf life prediction. Tutorial 5: New technologies (ingredients and process) for food degradation prevention or for improving the shelf-life: new ingredients, encapsulation. Tutorial 6: Case studies from practicals (properties of food packaging). Tutorial 7: Final Debriefing of practicals (wine fining and emulsions). Practical 1: Wine fining and emulsions. Practical 2: Properties of food packaging.				
Évaluations	CC : oral en groupe		CT : écrit individuel		
Coefficient	2		4		

D-M2-MP2-S3-MI-UE04 : FOOD AND WINE DESIGN BY THE MEAN OF MICROBIOLOGY
Module Obligatoire

D-M2-MP2-S3-MI-UE04-M01

Food and wine design by the mean of microbiology

Nb heures / étudiant	34				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	18	16	-	-	-
Nb groupes	1	1	-	-	-
Enseignants responsables	Elias BOU MAROUN, Stephane GUYOT				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences					
Objectifs Développement Durable	Consommation et production responsables				
Intervenants Internes	Helene LICANDRO, Cosette GRANDVALET, Yves WACHE, Stephane GUYOT				
Objectifs du module	During this teaching unit, students acquire skills in the selection, modification and implementation of microorganisms and microbial enzymes (physiological, biochemical and molecular), in the production of food and wine. Their competences also concern the products of interest (enzymes or flavours) of these microorganisms.				
Objectifs d'apprentissage	Knowing how to manage microbial populations over one or more than one generations (accelerated laboratory evolution: microbial domestication).				
Pré-requis	Basic knowledge in food microbiology and molecular biology.				
Contenu	Lactic acid bacteria metabolism Relevance of accelerated evolution approaches to adapt µo of interest Adaptation of <i>O. oeni</i> to low pH in wine context Biotechnology of microorganisms of interest Sequence alignment/KEGG approach + RTqPCR RNAseq analysis + 3D model of proteins: relevance to study the functionality of an enzyme microbial sensorial impact on food Wine microbiology: processes of winemaking + yeasts and Lactic acid bacteria actors Influence of µo on wine properties (yeast interactions and metabolomic) Laffort: microbial selection in oenology Project (include 2h of oral presentation)				
Évaluations	CT : écrit individuel		CC : oral en groupe		
Coefficient	4		2		

D-M2-MP2-S3-PH-UE04 : FOOD AND WINE DESIGN BY THE MEAN OF PHYSICAL CHEMISTRY
Module Obligatoire

D-M2-MP2-S3-PH-UE04-M01

Food and wine design by the mean of physical chemistry

Nb heures / étudiant	39				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	19	12	8	-	-
Nb groupes	1	1	-	-	-

Enseignants responsables	Stephane GUYOT, Elias BOU MAROUN, Ali ASSIFAOU, Camille LOUPIAC
Département/UPé	SCIENCES ALIMENTS-NUTRITION
Compétences	
Objectifs Développement Durable	Consommation et production responsables

Intervenants Internes	Camille LOUPIAC
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Objectifs du module	In this teaching unit, the chemistry and the physical chemistry of the food will be studied from the diluted (liquid) to the concentrated (solid state). main principles and theoretical aspects of physical chemistry applied to food and wine matrices will be presented: chemical reactions – complexities of matrices - main and minor constituents - chemical and physico-chemical multiscale characterization tools – formulation...The physico-chemical characterization of biopolymers (proteins and polysaccharides) and small molecules (aromas, antioxidants) as well as matrices (emulsion, gel suspension, powders) with the effect of the physico-chemical parameters (temperature, pH, Ionic strength ...) on their structure and functionalities will be studied in tutorials and practical class.
Objectifs d'apprentissage	
Pré-requis	
Contenu	Lecture 1: Liquids: Chemistry and Physical Chemistry of macromolecules in solution. Lecture 2: Suspensions & stability (stokes law / particules size/ intrinsic viscosity ...). Lecture 3: Introduction to wine physical chemistry. Lecture 4: Interface: Proteins-polysaccharide-fat-mixture-structural Characterization- Thermodynamical incompatibility. Lecture 5 : Interface: Emulsion-Foams- Proteins Tensioactivity-Characterization. Lectures 6 & 7: Solids: Amorphous / cristalline. Glass transition. Secondary relaxation. Phase and state diagrams. Tutorial 1: Wine Physicochemistry: compounds and matrices. Tutorial 2: Wine Practical Class project: Wine fining : Model Wine + Bentonite + resveratrol Practical: Wine fining: Bento+BLG+resveratrol. Protein-polysaccharide-fat mixture:BLG+triolein-BLG +pectin.

Évaluations	CT : écrit individuel	CC : oral en groupe
Coefficient	4	2

D-M2-MP2-S3-PH-UE05 : CHEMISTRY AND TOXICOLOGY APPLIED TO FOOD SAFETY
Module Obligatoire

D-M2-MP2-S3-PH-UE05-M01

Chemistry and toxicology applied to food safety

Nb heures / étudiant	35				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	16	11	8	-	-
Nb groupes	1	1	1	-	-
Enseignants responsables	Stephane GUYOT, Elias BOU MAROUN, Marie Christine CHAGNON				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences					
Objectifs Développement Durable	Consommation et production responsables				
Intervenants Internes	Isabelle SEVERIN, Marie Christine CHAGNON				
Objectifs du module	The objective of this teaching unit is to provide students with a thorough understanding of hazard identification, risk assessment, and risk management in food processes. The unit covers chemical risk assessment, food allergen management, and food contact packaging risk assessment through a combination of lectures, tutorials, and practical sessions. Students will learn to identify and evaluate hazards, apply analytical methods, and manage risks associated with food production and packaging. The course includes case studies, practical exercises in chemistry and toxicology analysis, and a visit to palteform facility, ensuring that students gain both theoretical knowledge and hands-on experience in food safety and risk management.				
Objectifs d'apprentissage					
Pré-requis					
Contenu	Lectures 1&2: Hazard Identification in Food Processes. Lecture 3: Food Risk assessment and management. Lecture 4: Chemical risk assessment: chemical characterization and analytical methods. Lecture 5: Food Allergen risk assessment and management. Lecture 6: Food contact packaging Risk Assessment. Tutorials 1&2: Chemical risk specification. Tutorilas 3&4: Analytical methods. Tutorial 5: Practical class preparation. Tutorials 6&7 : Cases Studies. Tutorial 8: Visit of Dertech. Tutorial 9: Debriefing Practical. Practical: Chemistry and toxicology analysis.				
Évaluations	CC : oral en groupe		CT : écrit individuel		
Coefficient	2		4		

D-M2-MP2-S3-MI-UE05 : FOOD PROCESSES AND EMERGING TECHNOLOGIES
Module Obligatoire

D-M2-MP2-S3-MI-UE05-M01

Food processes and emerging technologies

Nb heures / étudiant	40				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	21	19	-	-	-
Nb groupes	1	1	-	-	-
Enseignants responsables	Stephane GUYOT, Elias BOU MAROUN, Sebastien DUPONT				
Département/UPé	SCIENCES ALIMENTS-NUTRITION				
Compétences	A venir pour les formations autres qu'ingénieurs				
Objectifs Développement Durable	Consommation et production responsables				
Intervenants Internes	Laurent BENEY, Jean Marie PERRIER CORNET, Thibaut THERY, Stephane GUYOT, Sebastien DUPONT, Bonastre OLIETE MAYORGA				
Objectifs du module	Deep knowledge in microbiological processes of preservation and decontamination. Understanding of the effect of processes at the cellular level. Identification of key parameters involved in survival or death of microorganisms. Knowledge in current technological locks linked to microbiological processes requiring fundamental and applied research Methodology for research in microbiological processes (microbiological aspect, cellular thermodynamics...)				
Objectifs d'apprentissage	To consider the microbial response (when microorganisms have to face a physical or chemical challenge) to develop a new strategy to product/stabilize microorganisms of interest (probiotics and ferments) or to fight against undesired microorganisms (foodborne pathogens or alteration flora): combine cell biology and physics (process). Identify relevant scientific questions in the field of food microbial processes.				
Pré-requis	Basic knowledge in food microbiology and food processes				
Contenu	Introduction to food microbiological processes Management of microbial risk by processes Spores and HHP / Biopreservation Light processes to fight against undesired microorganisms R&D in Novolyze (development of surrogates to validate some food decontamination processes) Use of processes for beneficial microorganisms Production de µo en Bioreactors Hot-topics and outlook in food processes				
Évaluations	CT : écrit individuel			CC : oral en groupe	

Coefficient	4	2
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Semestre 4

Master 2 Microbiology and Physicochemistry for Food and Wine Processes - M2 MP2			
Unité d'enseignement	Module	Heures étudiant	Coefficient
D-M2-MP2-S4-UE06 - STAGE	Stage	80	30
Total		80	

Stage

Nb heures / étudiant	80				
Formes Pédago.	CM	TD	TP	ST	Vis
Nb heures	-	-	-	80	-
Nb groupes	-	-	-	1	-

Enseignants responsables	Elias BOU MAROUN, Stephane GUYOT
Département/UPé	SCIENCES ALIMENTS-NUTRITION
Compétences	
Objectifs Développement Durable	Consommation et production responsables

Intervenants Internes	Elias BOU MAROUN, Stephane GUYOT, Camille LOUPIAC, Laurent GAL
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Objectifs du module	The aim of the internship is to complement academic training with immersion in the professional world, enabling students to acquire practical skills and prepare effectively for their future careers in the agri-food industry. The internship will allow students to develop their critical analysis skills, identify problems, and propose innovative solutions. Students will be able to experiment and test hypotheses in a real environment, receiving direct feedback on the results obtained. The ultimate aim is to prepare students to pursue a PhD in academic laboratories, research institutes, or R&D departments of international food companies.
Objectifs d'apprentissage	
Pré-requis	
Contenu	The internship duration is at least 5 months and at most 6 months. It takes place mainly in the agri-food, pharmaceutical, or medical industries, in private research laboratories, or in academic reception laboratories. The nature of the internship, its duration, and the subject to be addressed are jointly determined by the internship supervisor and the master's program manager. The follow-up of these internships is ensured by an academic tutor, who may visit the host company. The internship culminates in a written report of 20 pages and an oral defence of 20 minutes before a jury. The internship is validated through an assessment evaluating both the written report and the oral defence. The evaluation of the student's skills by the internship supervisor is also taken into account in the overall assessment of the internship.

Évaluations	CT : Rapport de stage	CT : Soutenance de stage	Stage
Coefficient	12	12	6