



Syllabus

MASTER SCIENCES ET TECHNOLOGIE DE L'AGRICULTURE, DE L'ALIMENTATION ET DE L'ENVIRONNEMENT – MASTER IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION

Sommaire

PRESENTATION	4
SCHEMA GENERAL DU DOMAINE	4
SCHEMA DU CURSUS	4
SCHEMA DE LA MENTION	4
PARCOURS ET NIVEAUX	4
M2 MASTER IN AGRICULTURAL, FOOD, ENVIRONMENT AND NUTRITION	4
Parcours Master M2IMOAS – M2 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION – Semestre 1	5
Parcours Master M2IMOAS – M2 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION – Semestre 2	5
M1 MASTER IN AGRICULTURAL, FOOD, ENVIRONMENT AND NUTRITION	6
Parcours Master M1IMOAS – M1 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION – Semestre 1	6
Parcours Master M1IMOAS – M1 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION – Semestre 2	6
DETAILS DES ENSEIGNEMENTS	7
S-U02-4566 – UE 1: MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	8
S-E02-0710 – ECUE 1 PERFORM A MODELING METHOD TO EXPLAIN AND PREDICT A BIOLOGICAL COMPLEX PHENOMENA	9
S-E02-0711 – ECUE 2 MASTER THE MAIN IMAGING AND CHEMICAL ANALYSIS TECHNIQUES	10
S-U02-4567 – UE 2 MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	12
S-E02-0712 – ECUE 1 UNDERSTANDING ECOLOGICAL PRINCIPLES OF INTERACTIONS IN AGRO-ECOSYSTEMS, IN PARTICULAR BETWEEN CROPS, SPONTA	13
S-E02-0713 – ECUE 2 UNDERSTAND THE POTENTIAL OF FOOD BY-PRODUCTS FOR FOOD AND NON-FOOD APPLICATIONS	15
S-E02-0714 – ECUE 3 UNDERSTAND FOOD QUALITY ATTRIBUTES AND THEIR CHANGES TO IMPROVE SENSORIAL NUTRITIONAL CHARACTERISTICS (PAR	16
S-L02-0153 – OPTION AGRONOMY	17
S-U02-4568 – UE3: UNDERSTAND THE NEED TO CONSERVE PLANT GENETIC	18

RESOURCES AND METHODS OF USING THESE RESOURCES IN PLANT BREEDING	
S-U02-4569 - UE4: MASTER FUNDAMENTALS OF PLANT HEALTH, NUTRITION AND ADAPTATION TO THE ENVIRONMENT	19
S-E02-0715 - ECUE 1 PLANT HEALTH PART 2	20
S-E02-0716 - ECUE 2 PLANT ECOPHYSIOLOGY PART 2	21
S-L02-0154 - OPTION FOOD & HEALTH SCIENCES	23
S-U02-4570 - UE3: MASTER SAFETY OF THE PRODUCTION CHAIN OF FRESH OR PROCESSED FRUITS AND VEGETABLES	24
S-U02-4571 - UE4: MASTER THE ROLE OF MICRONUTRIENTS IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS	25
S-E02-0717 - ECUE 1 MICRONUTRIENT IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS	26
S-E02-0718 - ECUE 2 IMPACT OF NUTRITION ON CHRONIC NON-COMMUNICABLE DISEASES	27
S-U02-4572 - UE5 BE ABLE TO COLLECT, ANALYZE, AND INTERPRET DATA AS WELL AS CONDUCT IN-DEPTH LITERATURE REVIEWS FOR A COMPANY	28
S-U02-4573 - UE6 CONFERENCE CYCLE	29
S-U02-4574 - UE7 FRENCH FOR BEGINNERS	30
S-U02-4575 - UE 4: CONFERENCE CYCLE	31
S-U02-4576 - UE 5: IMPLEMENTING AND EVALUATING A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH (AMS, INTERSHIP INCLUDED)	32
S-U02-4551 - UE 1: MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	33
S-E02-0701 - ECUE 1 USE BASIC PROBABILISTIC AND STATISTICAL METHODS TO SOLVE A SCIENTIFIC QUESTION	34
S-E02-0702 - ECUE 2 CONDUCT A SCIENTIFIC RESEARCH RESPECTING ETHICS AND GOOD PRACTICES	35
S-E02-0703 - ECUE 3 EXTRACT INFORMATION FROM A LARGE DATASET WITH MULIVARIATE STATISTICAL ANALYSIS	37
S-U02-4552 - UE 2 MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	38
S-E02-0704 - ECUE 1 MASTER FUNDAMENTAL OF PLANT HEALTH (PART1 FUNDAMENTALS)	39
S-E02-0705 - ECUE 2 MASTER FUNDAMENTAL OF ECOLOGY, EVOLUTION & GENETICS	40
S-E02-0706 - ECUE 3 UNDERSTAND FOOD QUALITY ATTRIBUTES AND THEIR CHANGES TO IMPROVE SENSORIAL NUTRITIONAL FEATURES	41
S-E02-0707 - ECUE 4 MASTER THE MAIN CLASSES OF FOOD COMPONENTS	42
S-L02-0151 - OPTION AGRONOMY	44
S-U02-4553 - UE3 MASTER AGRONOMY, PLANTS AND ENVIRONMENT	45
S-U02-4554 - UE4 UNDERSTAND INTEGRATED NUTRITION AND METABOLISM OF PLANTS	47
S-L02-0152 - OPTION FOOD & HEALTH SCIENCES	49
S-U02-4555 - UE3 UNDERSTAND PHYSIOLOGY OF HUMAN NUTRITION AND CONSUMERS BEHAVIORS	50
S-U02-4556 - UE4 BE ABLE TO IDENTIFY AND CLASSIFY DIFFERENT TYPES OF MICRO-ORGANISMS AND EXPLORE THEIR ABILITY TO CARRY OUT BIO-	51
S-U02-4557 - UE5 BE ABLE TO COLLECT, ANALYZE, AND INTERPRET DATA AS WELL	52

AS CONDUCT IN-DEPTH LITERATURE REVIEWS FOR A LABORATORY	
S-U02-4558 - UE6 CONFERENCE CYCLE	53
S-U02-4559 - UE7 FRENCH FOR BEGINNERS	54
S-U02-4560 - UE 1 UNDERSTAND TOXICOLOGY DEFINITION AND CONTAMINATION OF PLANT PRODUCTION BY TOXIC SUBSTANCES	55
S-U02-4561 - UE 2 MASTER FRUITS AND VEGETABLE PROCESSING AND CONSEQUENCES ON THEIR QUALITIES	56
S-L02-0155 - CHOOSE 1 OPTION	57
S-U02-4562 - UE 3 UNDERSTAND THE ESSENTIALS OF BIOCLIMATOLOGY, SOIL PHYSICS AND BIOGEOCHEMISTRY (PART 1).	58
S-U02-4563 - UE 3 MASTER MICROBIAL CLASSIFICATION, BIO-TRANSFORMATIONS, AND PHYTOCHEMICALS IN PLANTS PROCESSING AND	59
S-E02-0708 - ECUE1 BE ABLE TO IDENTIFY AND CLASSIFY DIFFERENT TYPES OF MICRO-ORGANISMS AND EXPLORE THEIR ABILITY TO CARRY OUT BI	60
S-E02-0709 - ECUE2 MASTER PHYTOCHEMICALS IN FRUIT AND VEGETABLE PROCESSING AND GASTROINTESTINAL DIGESTION	61
S-U02-4564 - UE 4 CONFERENCE CYCLE	62
S-U02-4565 - UE 5 IMPLEMENTING AND EVALUATING A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH (AMS, INTERSHIP INCLUDED)	63

PRESENTATION



Diplôme

BAC+5

Durée

2 ans

Lieux

Campus Jean-Henri Fabre - UFR STS

Régime d'étude

initial, continu

Secteur

Agroalimentaire - Environnement - International

Niveau d'entrée

BAC +3

Certifiant

Oui

Stage

Obligatoire

Coût de la formation

Oui

Composante

Domaine : Agros sciences, Environnement et Santé**Description :** Ce texte sera renseigné prochainement.**Doyen-ne :** Stephane Nottin

Equipe enseignante et du laboratoire

Conditions d'admission

SCHEMA GENERAL DU DOMAINE

SCHEMA DU CURSUS

SCHEMA DE LA MENTION

PARCOURS ET NIVEAUX

M2 MASTER IN AGRICULTURAL, FOOD, ENVIRONMENT AND NUTRITION

Responsable : Philippe Obert

Parcours Master M2IMOAS - M2 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION - Semestre 1
Responsable : Philippe Obert

Code	Enseignements et Unités d'enseignements	Volume H.	Coefficient	ECTS
S-U02-4566	UE 1: MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	68h00	8.00	8.00
S-E02-0710	ECUE 1 PERFORM A MODELING METHOD TO EXPLAIN AND PREDICT A BIOLOGICAL COMPLEX PHENOMENA	35h30	4.00	4.00
S-E02-0711	ECUE 2 MASTER THE MAIN IMAGING AND CHEMICAL ANALYSIS TECHNIQUES	32h30	4.00	4.00
S-U02-4567	UE 2 MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	69h00	8.00	8.00
S-E02-0712	ECUE 1 UNDERSTANDING ECOLOGICAL PRINCIPLES OF INTERACTIONS IN AGRO-ECOSYSTEMS, IN PARTICULAR BETWEEN CROPS, SPONTA	26h00	3.00	3.00
S-E02-0713	ECUE 2 UNDERSTAND THE POTENTIAL OF FOOD BY-PRODUCTS FOR FOOD AND NON-FOOD APPLICATIONS	16h00	3.00	3.00
S-E02-0714	ECUE 3 UNDERSTAND FOOD QUALITY ATTRIBUTES AND THEIR CHANGES TO IMPROVE SENSORIAL NUTRITIONAL CHARACTERISTICS (PAR	27h00	2.00	2.00
S-L02-0153	OPTION AGRONOMY			
S-U02-4568	UE3: UNDERSTAND THE NEED TO CONSERVE PLANT GENETIC RESOURCES AND METHODS OF USING THESE RESOURCES IN PLANT BREEDING	25h00	4.00	4.00
S-U02-4569	UE4: MASTER FUNDAMENTALS OF PLANT HEALTH, NUTRITION AND ADAPTATION TO THE ENVIRONMENT	29h00	4.00	4.00
S-E02-0715	ECUE 1 PLANT HEALTH PART 2	14h00	2.00	2.00
S-E02-0716	ECUE 2 PLANT ECOPHYSIOLOGY PART 2	15h00	2.00	2.00
S-L02-0154	OPTION FOOD & HEALTH SCIENCES			
S-U02-4570	UE3: MASTER SAFETY OF THE PRODUCTION CHAIN OF FRESH OR PROCESSED FRUITS AND VEGETABLES	12h00	2.00	2.00
S-U02-4571	UE4: MASTER THE ROLE OF MICRONUTRIENTS IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS	42h00	6.00	6.00
S-E02-0717	ECUE 1 MICRONUTRIENT IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS	19h30	2.00	3.00
S-E02-0718	ECUE 2 IMPACT OF NUTRITION ON CHRONIC NON-COMMUNICABLE DISEASES	22h30	2.00	3.00
S-U02-4572	UE5 BE ABLE TO COLLECT, ANALYZE, AND INTERPRET DATA AS WELL AS CONDUCT IN-DEPTH LITERATURE REVIEWS FOR A COMPANY	60h00	4.00	4.00
S-U02-4573	UE6 CONFERENCE CYCLE	06h00	1.00	1.00
S-U02-4574	UE7 FRENCH FOR BEGINNERS	60h00	1.00	1.00

Parcours Master M2IMOAS - M2 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION - Semestre 2
Responsable : Philippe Obert

Code	Enseignements et Unités d'enseignements	Volume H.	Coefficient	ECTS
S-U02-4575	UE 4: CONFERENCE CYCLE	06h00	1.00	1.00

Code	Enseignements et Unités d'enseignements	Volume H.	Coefficient	ECTS
S-U02-4576	UE 5: IMPLEMENTING AND EVALUATING A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH (AMS, INTERSHIP INCLUDED)	10h00	29.00	29.00

M1 MASTER IN AGRICULTURAL, FOOD, ENVIRONMENT AND NUTRITION

Responsable : Philippe Obert

Parcours Master M1MOAS - M1 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION - Semestre 1

Responsable : Philippe Obert

Code	Enseignements et Unités d'enseignements	Volume H.	Coefficient	ECTS
S-U02-4551	UE 1: MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	66h30	8.00	7.00
S-E02-0701	ECUE 1 USE BASIC PROBABILISTIC AND STATISTICAL METHODS TO SOLVE A SCIENTIFIC QUESTION	25h30	4.00	3.00
S-E02-0702	ECUE 2 CONDUCT A SCIENTIFIC RESEARCH RESPECTING ETHICS AND GOOD PRACTICES	21h00	2.00	2.00
S-E02-0703	ECUE 3 EXTRACT INFORMATION FROM A LARGE DATASET WITH MULIVARIATE STATISTICAL ANALYSIS	20h00	2.00	2.00
S-U02-4552	UE 2 MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH	67h00	8.00	7.00
S-E02-0704	ECUE 1 MASTER FUNDAMENTAL OF PLANT HEALTH (PART1 FUNDAMENTALS)	15h00	2.00	2.00
S-E02-0705	ECUE 2 MASTER FUNDAMENTAL OF ECOLOGY, EVOLUTION & GENETICS	15h00	2.00	2.00
S-E02-0706	ECUE 3 UNDERSTAND FOOD QUALITY ATTRIBUTES AND THEIR CHANGES TO IMPROVE SENSORIAL NUTRITIONAL FEATURES	16h00	1.00	1.00
S-E02-0707	ECUE 4 MASTER THE MAIN CLASSES OF FOOD COMPONENTS	21h00	3.00	2.00
S-L02-0151	OPTION AGRONOMY			
S-U02-4553	UE3 MASTER AGRONOMY, PLANTS AND ENVIRONMENT	30h00	4.00	4.00
S-U02-4554	UE4 UNDERSTAND INTEGRATED NUTRITION AND METABOLISM OF PLANTS	30h00	4.00	4.00
S-L02-0152	OPTION FOOD & HEALTH SCIENCES			
S-U02-4555	UE3 UNDERSTAND PHYSIOLOGY OF HUMAN NUTRITION AND CONSUMERS BEHAVIORS	30h00	4.00	4.00
S-U02-4556	UE4 BE ABLE TO IDENTIFY AND CLASSIFY DIFFERENT TYPES OF MICRO-ORGANISMS AND EXPLORE THEIR ABILITY TO CARRY OUT BIO-	30h00	4.00	4.00
S-U02-4557	UE5 BE ABLE TO COLLECT, ANALYZE, AND INTERPRET DATA AS WELL AS CONDUCT IN-DEPTH LITERATURE REVIEWS FOR A LABORATORY	60h00	6.00	6.00
S-U02-4558	UE6 CONFERENCE CYCLE	06h00	1.00	1.00
S-U02-4559	UE7 FRENCH FOR BEGINNERS	60h00	1.00	1.00

Parcours Master M1MOAS - M1 : IN AGRICULTURAL, FOOD, ENVIRONNEMENT AND NUTRITION - Semestre 2

Responsable : Philippe Obert

Code	Enseignements et Unités d'enseignements	Volume H.	Coefficient	ECTS
------	---	-----------	-------------	------

S-U02-4560	UE 1 UNDERSTAND TOXICOLOGY DEFINITION AND CONTAMINATION OF PLANT PRODUCTION BY TOXIC SUBSTANCES	25h00	4.00	4.00
S-U02-4561	UE 2 MASTER FRUITS AND VEGETABLE PROCESSING AND CONSEQUENCES ON THEIR QUALITIES	21h00	4.00	4.00
S-L02-0155	CHOOSE 1 OPTION			
S-U02-4562	UE 3 UNDERSTAND THE ESSENTIALS OF BIOCLIMATOLOGY, SOIL PHYSICS AND BIOGEOCHEMISTRY (PART 1).	24h00	4.00	4.00
S-U02-4563	UE 3 MASTER MICROBIAL CLASSIFICATION, BIO-TRANSFORMATIONS, AND PHYTOCHEMICALS IN PLANTS PROCESSING AND	24h00	4.00	4.00
S-E02-0708	ECUE1 BE ABLE TO IDENTIFY AND CLASSIFY DIFFERENT TYPES OF MICRO-ORGANISMS AND EXPLORE THEIR ABILITY TO CARRY OUT BI	12h00	2.00	2.00
S-E02-0709	ECUE2 MASTER PHYTOCHEMICALS IN FRUIT AND VEGETABLE PROCESSING AND GASTROINTESTINAL DIGESTION	12h00	2.00	2.00
S-U02-4564	UE 4 CONFERENCE CYCLE	06h00	1.00	1.00
S-U02-4565	UE 5 IMPLEMENTING AND EVALUATING A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH (AMS, INTERSHIP INCLUDED)	10h00	17.00	17.00

DETAILS DES ENSEIGNEMENTS



S-U02-4566 - UE 1: MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
8.00	8.00	FLORENT BONNEU	68h00	Semestre 1

Objectifs

MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Description

See
ECUE 1 PERFORM A MODELING METHOD TO EXPLAIN AND PREDICT A BIOLOGICAL COMPLEX PHENOMENA
ECUE 2 MASTER THE MAIN IMAGING AND CHEMICAL ANALYSIS TECHNIQUES

Travail attendu

Modalités de contrôle des connaissances

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0710 - ECUE 1 PERFORM A MODELING METHOD TO EXPLAIN AND PREDICT A BIOLOGICAL COMPLEX PHENOMENA

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	FLORENT BONNEU	35h30 - CM : 22h00 TDI : 10h30 TP : Semestre 1 03h00	

Objectifs

STATISTICAL MODELS IN AGROSCIENCE

Mobilize knowledge to carry out exploratory and descriptive statistical analyses and modeling methods adapted to an experimental dataset and a concrete scientific problem in Agrosiences

Description

STATISTICAL MODELS IN AGROSCIENCE

Perform a modeling method to explain and predict a biological complex phenomenon? teaching unit focuses on the following points:

- Mobilize knowledge to carry out exploratory and descriptive statistical analyses and modeling methods adapted to an experimental dataset and a concrete scientific problem in Agrosiences.
- Advances in digital technology in data processing are leading to changes in the mathematical tools available today, which must be part of the basic background of a student intending to do research

Travail attendu

Modalités de contrôle des connaissances

STATISTICAL MODELS IN AGROSCIENCE

Devoir sur table 50% 1H30

Présentation orale 50% 2H00

GRAPHS AND MARKOV MODELS

Devoir sur table 100% 1H

ECOPHYSIOLOGICAL MODELING IN GENETIC CONTROL

Devoir sur table 100% 1H

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0711 - ECUE 2 MASTER THE MAIN IMAGING AND CHEMICAL ANALYSIS TECHNIQUES

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	RAPHAEL LUGAN	32h30 - CM : 17h30 TDI : 06h00 TP : Semestre 1 09h00	

Objectifs

Master the main imaging and chemical analysis techniques used to solve scientific questions in agrosocieties.

Description

QUALITY CONTROL & ANALYSIS, METABOLOMICS

Discover the principles of metabolomic analysis by mass spectrometry and learn the principles of metabolomics applied to the quality analysis of plant productions.

Mobilize knowledge in metabolomics for applications in food industry.

FORMULATION OF FOOD PRODUCTS, CONVERSION OF AGRO-FOOD WASTES

- Particle characterization methods for food formulation and processing : the course will provide a comprehensive description of the dynamic light-scattering technique and its use for the characterization of self-aggregation in food processing. An experimental set-up will be presented.

- Nuclear Magnetic Resonance and Electron Paramagnetic Resonance for food formulation and analysis : the course will provide a comprehensive description of the two techniques. Applications in food formulation and processing through several examples will be provided

IMAGING AND TECHNIQUES OF INTERNAL INVESTIGATION

Imaging techniques, whether for illustrative or quantitative purposes, have become a significant lever in all fields of science and industry. Acquiring basic knowledge in this area is now essential for scientists. The course will give some basics in mathematical morphology and keys to facilitate the use of the open source ImageJ software in order to easily handle, filter and process images.

Travail attendu

Modalités de contrôle des connaissances

QUALITY CONTROL & ANALYSIS, METABOLOMICS

Devoir sur table QCM 50% 1H

Devoir sur table 50% 0,5H

FORMULATION OF FOOD PRODUCTS, CONVERSION OF AGRO-FOOD WASTES

Written test on particle characterization methods and Nuclear Magnetic Resonance and Electron Paramagnetic Resonance for food formulation (50 minutes)

Devoir sur table 100% 1H

IMAGING AND TECHNIQUES OF INTERNAL INVESTIGATION

Présentation orale 100%

Prérequis

Basic knowledge in chemistry (bachelor level)
Bases in plant biology and in phytochemistry
Bases in statistics

Compétences acquises

- Master the main imaging and chemical analysis techniques used in agrosience.
- Use the theory of chromatography and mass spectrometry techniques to select suitable methods for different metabolic targets.
- Use the knowledge of the principles and scope of metabolomics to address fraud detection, sourcing and process monitoring.
- General knowledge of the principles and application of Nuclear Magnetic Resonance and Electron Paramagnetic Resonance in food science
- General knowledge of the principles and methods of Particle size determination

**Références bibliographiques et
ressources numériques**

S-U02-4567 - UE 2 MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
8.00	8.00	-	69h00	Semestre 1

Objectifs

MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Description

See
ECUE 1 Understanding ecological principles of interactions in agro-ecosystems, in particular between crops, spontaneously occurring plants and arthropods
ECUE 2 UNDERSTAND THE POTENTIAL OF FOOD BY-PRODUCTS FOR FOOD AND NON-FOOD APPLICATIONS
ECUE 3 Understand food quality attributes and their changes to improve sensorial nutritional characteristics (Part 2: innovation food processing)

Travail attendu

Modalités de contrôle des connaissances

See the specific assessment procedures for each of the ECUE that make up the EU

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0712 - ECUE 1 UNDERSTANDING ECOLOGICAL PRINCIPLES OF INTERACTIONS IN AGRO-ECOSYSTEMS, IN PARTICULAR BETWEEN CROPS, SPONTA

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
3.00	3.00	ARMIN BISCHOFF	26h00 – CM : 10h00 TP : 16h00	Semestre 1

Objectifs

The module Agroecology aims at an understanding of ecological interactions in agro-ecosystems, in particular interactions between crops, spontaneously occurring plants and arthropods. The major objectives are

(1) Learning to develop experimental protocols in order to analyse scientific questions,

(2) Testing such protocols in the lab and in the field.

Such improved understanding allows the participants to develop skills in conservation biological control and environmental evaluation of agrochemical use.

Description

The Agroecology teaching unit focuses on the following points:

- Control of pest insects, regulation by natural enemies, conservation biological control using agro-ecological infrastructures (wildflower strips, grass strips, hedgerows, etc.)
- Chemical control and the influence of agricultural practices
- Impact of agrochemicals on arthropods
- Practical Labwork: effects of crop management and surrounding habitats on arthropods: biological control and ecotoxicological risk assessment. Objective: learning to develop experimental protocols in order to analyse scientific questions, testing these protocols in the lab and in the field.
- Approaches to improve conservation biological control and methods to test its efficiency
- Impact of pesticides on non-target organisms and their ecological functions: from the molecule to population
- Master natural selection of chemical elements in the critical zone and the history of agriculture during the last 10 000 years

Travail attendu

Relevés floristic and arthropod observation to analyse effects of field margin vegetation.
Arthropod trapping.
Analysis of field data using correlative statistics (regression analysis and statistical testing)
Ecotoxicological studies in the lab and data analysis

Modalités de contrôle des connaissances

Report on interactions between flora and arthropods
Report on arthropod diversity
Report on ecotoxicological study

Rapport écrit maison 33%
Présentation orale 33%

Devoir sur table écrit 34%

Prérequis

Good command in Excel
Basic knowledge in test statistics using R

Compétences acquises**Références bibliographiques et
ressources numériques**

S-E02-0713 - ECUE 2 UNDERSTAND THE POTENTIAL OF FOOD BY-PRODUCTS FOR FOOD AND NON-FOOD APPLICATIONS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
3.00	3.00	CARINE LE BOURVELLEC	16h00 - CM : 07h00 TDI : 09h00	Semestre 1

Objectifs

Understand how to produce energy and/or added-value products from the recycling of these wastes is a major challenge from both environmental and economic perspectives

Description

Agro-food wastes potential teaching unit focuses on the following points:

- Understand the potential of food by-products for food and non-food applications
- Introduction to basic knowledge of bioeconomy, biorefinery and eco-design concepts. Illustration with winery by-products and distilleries
- Dry fractionation of agricultural by-products and wood resources as a processing step to produce energy, molecules and materials
- Sugar- and lipid-derived building blocks for the production of bioplastics. During interactive tutorial sessions, case-studies will be examined and a workshop will be prepared.

Travail attendu

Modalités de contrôle des connaissances

Présentation orale 50% 2H
Rapport écrit maison 50%

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0714 - ECUE 3 UNDERSTAND FOOD QUALITY ATTRIBUTES AND THEIR CHANGES TO IMPROVE SENSORIAL NUTRITIONAL CHARACTERISTICS (PAR

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	SANDRINE PERINO	27h00 - CM : 15h00 TP : 12h00	Semestre 1

Objectifs

Master green and innovative food processing, and sustainability in the food industry

Description

The food quality attributes and their changes to improve sensorial nutritional characteristics? teaching unit focuses on the following points:

- Understand food quality attributes and their changes depending on innovative food processing and storage technologies to improve the sensorial and nutritional characteristics of plant food.
- Presentation of new technologies
- How to create innovation and intellectual property for applied research
- Current postharvest research and innovations and sustainable technology

Travail attendu

Modalités de contrôle des connaissances

Devoir sur table écrit 70%
Rapport TP écrit maison 30%

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-L02-0153 - OPTION AGRONOMY

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
-	-	-	-	Semestre 1

Objectifs
Description
Travail attendu
**Modalités de contrôle des
connaissances**
Prérequis
Compétences acquises
**Références bibliographiques et
ressources numériques**

S-U02-4568 - UE3: UNDERSTAND THE NEED TO CONSERVE PLANT GENETIC RESOURCES AND METHODS OF USING THESE RESOURCES IN PLANT BREEDING

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	MORGANE ROTH	25h00 – CM : 18h00 TDI : 07h00	Semestre 1

Objectifs

Master seed biology and management of seed collections, plant breeding strategies, developing abilities to analyze complex problems, biostatistics & quantitative genetics, evolutionary biology

Description

Plant breeding teaching unit focuses on the following points:

- Understand the need for conservation of plant genetic resources and the main methods by which these resources are used in plant breeding
- Understanding the need for plant genetic resources conservation and related techniques
- Understanding the majors stakes of plant breeding
- Getting familiar with the majors breeding methods relying on molecular biology, biostatics and quantitative genetics
- Getting familiar with the forces ruling the evolution of live organisms (plants and their pathogens)

Travail attendu

Modalités de contrôle des connaissances

Contrôle des connaissances écrit et oral sur la partie préservation des ressources génétiques (contrôle continu) 35%
Tester les connaissances acquises dans toute l'UE 50%
Analyse critique d'un article en groupe pour valider la compréhension du cours sur les méthodes prédictives en amélioration des plantes 15%

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4569 - UE4: MASTER FUNDAMENTALS OF PLANT HEALTH, NUTRITION AND ADAPTATION TO THE ENVIRONMENT

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	MARC BARDIN	29h00	Semestre 1

Objectifs

ECUE 1 PLANT HEALTH PART 2
ECUE 2 PLANT ECOPHYSIOLOGY PART 2

Description

Travail attendu

Modalités de contrôle des connaissances

see the specific assessment procedures for each of the ECUE that make up the EU.

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0715 - ECUE 1 PLANT HEALTH PART 2

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	MARC BARDIN	14h00 - CM : 06h00 TDI : 08h00	Semestre 1

Objectifs

Be able to understand a range of advanced topics related to the complex factors intervening in plant health and their consideration when establishing integrated pest management of cropping systems. The students will have opportunities to debate and present critical evaluation of different types of plant health scenario and paradigms

Description

Fundamentals of plant health, nutrition and adaptation to the environment? teaching unit focuses on the following points:

- Understand how environmental factors influence yield, quality of production and plant defenses and how to modulate these factors to improve crop performance
- Principles and challenges of integrated pest management and integrated plant health management.
- Fundamentals of evolution & population genetics of plant bioagressors
- Biological control of plant diseases. The main types of biocontrol agents against diseases, their modes of actions and the key factors of their efficacy in the field.

Travail attendu

Modalités de contrôle des connaissances

Présentation orale Coeff 1, 2H

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0716 - ECUE 2 PLANT ECOPHYSIOLOGY PART 2

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	LAURENT URBAN	15h00 - CM : 05h00 TDI : 05h00 TP Semestre 1 : 05h00	

Objectifs

Students should be capable to understand how abiotic and biotic factors and agronomic practices, and their interactions influences yield, quality of production and plant defenses.
Students should notably be able to explain how the global change will affect plant growth and development, and crop performance.
At the end of the course, students should have a comprehensive view of the major concepts and tools used in plant ecophysiology, as well as a first experience of them for research or field diagnosis.

Description

Generally speaking, this course is designed to be a basis for courses of agronomy, crop protection and management of quality of production.

- Introduction to ecophysiology : learning how physiological functions influence yield, quality of production and plant defenses (plant water relationships, metabolism and defenses, metabolism and quality of production).
- Photosynthesis from an ecophysiological perspective : learning how environmental factors influence photosynthesis and its components (photosynthetic capacity, photorespiration, respiration ?)
- Oxidative stress and photooxidative stress : learning the importance of oxidative stress and its consequences for plant physiology, yield, quality and defenses
- Field tools for analyzing photosynthesis : getting familiar with actual tools used in ecophysiology and agronomy
- Metabolism and defenses : the objective of this course is to show how metabolic pathways are involved in plant responses to biotic stresses, and how the plant's environment (e.g. water availability, nutrients) contributes to a given metabolic status more or less adapted to an effective defense. A general lecture will be given to set metabolic processes in the overall defense cascade against pests and pathogens with different infection and virulence strategies, and illustrate the impact of the abiotic environment. In an interactive tutorial session, case-studies of metabolic switches towards defense will be examined.
- Metabolism and quality of production : learning how environmental factors influence plant phenology and physiology, assimilate partitioning, primary and secondary metabolism, and consequently the quality of production.

Travail attendu

Students will attend lectures, use computer simulations and participate in small trials, which objective is to make them acquainted with some of the tools used in plant ecophysiology.

Modalités de contrôle des connaissances

2 devoirs sur table écrit 2H coeff chacun 0,5

Prérequis

Basic concepts of plant physiology, plant pathology, biochemistry and biophysics

Compétences acquises

Capacity to understand how environmental factors, including agronomic levers and stress, influence yield, quality of production and plant defenses. Capacity to propose strategies to maintain or improve crop performance and reduce pesticide use in the context of climatic change. Basic competences with the major field tools of plant ecophysiology.

**Références bibliographiques et
ressources numériques**

Plant Physiology. Taiz and Zeiger (eds.). Sinauer (publisher)

S-L02-0154 - OPTION FOOD & HEALTH SCIENCES

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire
-	-	-	-

Période
Semestre 1

Objectifs

Description

Travail attendu

**Modalités de contrôle des
connaissances**

Prérequis

Compétences acquises

**Références bibliographiques et
ressources numériques**

S-U02-4570 - UE3: MASTER SAFETY OF THE PRODUCTION CHAIN OF FRESH OR PROCESSED FRUITS AND VEGETABLES

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	CATHERINE DUPORT DIT ROUSSEAU	12h00 - CM : 09h00 TDI : 03h00	Semestre 1

Objectifs

Be able to identify and classify different types of micro-organisms (bacteria, fungi, viruses, archaea) and explore their ability to carry out bio-transformations, including metabolic processes that convert phytochemicals- Bacterial hazards: contamination routes and principles of control

Description

Safety of the production chain of fresh or processed fruits and vegetables teaching unit focuses on the following points:

- Be able to identify and classify different types of micro-organisms (bacteria, fungi, viruses, archaea) and explore their ability to carry out bio-transformations, including metabolic processes that convert phytochemicals
- Microbiological hazard characterization. Bacterial toxins
- Applying mathematical model for risk assessment. Model for prediction of survival or growth. Models for environmental dispersion

Travail attendu

Modalités de contrôle des connaissances

Devoir sur table écrit 50%
Oral 25%
Devoir sur table écrit 50%

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4571 - UE4: MASTER THE ROLE OF MICRONUTRIENTS IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
6.00	6.00	PHILIPPE OBERT	42h00	Semestre 1

Objectifs MASTER THE ROLE OF MICRONUTRIENTS IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS

Description See
ECUE 1 MICRONUTRIENT IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS
ECUE 2 IMPACT OF NUTRITION ON CHRONIC NON-COMMUNICABLE DISEASES

Travail attendu

Modalités de contrôle des connaissances See the specific assessment procedures for each of the ECUE that make up the EU.

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0717 - ECUE 1 MICRONUTRIENT IN NUTRITION: FROM ABSORPTION TO HEALTH EFFECTS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
3.00	2.00	CYRIL REBOUL	19h30 – CM : 15h00 TDI : 04h30	Semestre 1

Objectifs Be able to explain micronutrients in nutrition: from their absorption to their health effects

Description Distinguish food components between macronutrients, micronutrients (vitamins, minerals) and other bioactive compounds (e.g., phytochemicals, toxins)
Master the mechanisms of absorption of micronutrients and phytochemicals and identify signaling pathways they modulate

Travail attendu Reading scientific papers, oral presentations

Modalités de contrôle des connaissances Written exam 70%
Oral presentation 30%

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0718 - ECUE 2 IMPACT OF NUTRITION ON CHRONIC NON-COMMUNICABLE DISEASES

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
3.00	2.00	PHILIPPE OBERT	22h30 - CM : 16h30 TDI : 04h30 TP : Semestre 1 01h30	

Objectifs
Understand the influence of common diets on health, in particular on chronic non-communicable diseases and understand the main international recommendations in human nutrition

Description
Basics of main chronic non-communicable diseases;
Diet regimen and their impact on health;
Risk factors: the importance of fatty acids, dietary fibers, phytosterols, vitamins, micronutrients (carotenoids, polyphenols);
From organ to cell approach : heart and vessels.

Travail attendu
Reading scientific papers, oral presentations.

Modalités de contrôle des connaissances
Written exam 60%
Oral presentation 40%

Prérequis
Bachelor in sciences (chemistry, biology)

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4572 - UE5 BE ABLE TO COLLECT, ANALYZE, AND INTERPRET DATA AS WELL AS CONDUCT IN-DEPTH LITERATURE REVIEWS FOR A COMPANY

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	PHILIPPE OBERT	60h00 – TDI : 60h00	Semestre 1

Objectifs

– Mobilize the knowledge and skills acquired previously and during training to respond to upstream problems posed by manufacturers.

Description

Travail attendu

Modalités de contrôle des connaissances

Written report (50%) plus oral presentation (50%)

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4573 - UE6 CONFERENCE CYCLE

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
1.00	1.00	-	06h00 - CM : 06h00	Semestre 1

Objectifs**Description****Travail attendu****Modalités de contrôle des
connaissances****Prérequis****Compétences acquises****Références bibliographiques et
ressources numériques**

S-U02-4574 - UE7 FRENCH FOR BEGINNERS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
1.00	1.00	-	60h00 - TDI : 60h00	Semestre 1

Objectifs**Description****Travail attendu****Modalités de contrôle des
connaissances****Prérequis****Compétences acquises****Références bibliographiques et
ressources numériques**

S-U02-4575 - UE 4: CONFERENCE CYCLE

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
1.00	1.00	-	06h00 - CM : 06h00	Semestre 2

Objectifs
Description
Travail attendu
**Modalités de contrôle des
connaissances**
Prérequis
Compétences acquises
**Références bibliographiques et
ressources numériques**

S-U02-4576 - UE 5: IMPLEMENTING AND EVALUATING A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH (AMS, INTERSHIP INCLUDED)

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
29.00	29.00	PHILIPPE OBERT	10h00 - TDI : 10h00	Semestre 2

Objectifs
Be able to IMPLEMENT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Description
Under the responsibility of a tutor, the student will acquire skills enabling him to improve his ability to summarise the state of the art on a given subject; his ability to construct a methodology adapted to specific objectives; to summarise, process statistically and report experimental results and to discuss them.

Travail attendu
Research and innovation internship in an academic research laboratory or in the private sector

Modalités de contrôle des connaissances
Written report (34%) plus oral presentation (33%) plus internship mark by the tutor (33%)

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4551 - UE 1: MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
7.00	8.00	FLORENT BONNEU	66h30	Semestre 1

Objectifs

MASTER SCIENTIFIC METHODS TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Description

See
ECUE 1 USE BASIC PROBABILISTIC AND STATISTICAL METHODS TO SOLVE A SCIENTIFIC QUESTION
ECUE 2 CONDUCT A SCIENTIFIC RESEARCH RESPECTING ETHICS AND GOOD PRACTICES
ECUE 3 EXTRACT INFORMATION FROM A LARGE DATASET WITH MULIVARIATE STATISTICAL ANALYSIS

Travail attendu

Modalités de contrôle des connaissances

see the specific assessment procedures for each of the ECUE that make up the EU.

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0701 - ECUE 1 USE BASIC PROBABILITIC AND STATISTICAL METHODS TO SOLVE A SCIENTIFIC QUESTION

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
3.00	4.00	CELINE LACAUX	25h30 - CM : 09h00 TDI : 16h30	Semestre 1

Objectifs

Mobilize knowledge to carry out exploratory and descriptive statistical analyses and modeling methods adapted to an experimental dataset and a concrete scientific problem in Agrosciences

Description

Use basic probability and statistical methods to solve a scientific question? teaching unit focuses on the following points:

- Master the definitions and rules of probability calculus, the presentation of the most useful random variables and their characteristics.
 - Master the Central Limit Theorem, which plays an important role in the following parts on parameter estimation and hypothesis testing.
- Master variance analysis, linear regression and an introduction toward the generalized linear models. Teaching focuses rigorously on mathematical application hypothesis and illustrates concepts on practical examples with the R software.

Travail attendu

Devoir sur table 1H 50%
Devoir sur table 1H 50%

Modalités de contrôle des connaissances

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0702 - ECUE 2 CONDUCT A SCIENTIFIC RESEARCH RESPECTING ETHICS AND GOOD PRACTICES

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	PHILIPPE OBERT	21h00 - CM : 14h00 TDI : 05h00 TP : 02h00	Semestre 1

Objectifs

* Ethics & scientific integrity
At the end of this course, students will be able to:

- Navigate the legal, social and regulatory framework in which agriscience research is conducted.
- Assert a basic understanding of the goals, methods and practice of scientific research, so as to avoid the pitfalls of misconduct and malpractice. (scientific integrity)
- Understand how scientific activity changes our lives and impacts society, for good or for bad, and acquire a framework to help you control this impact (research ethics)
- Apply this general framework to the context of agriscience technologies
- Finally acquire an overview of some important ethical debates around agriscience, such as GMO food, animal and human experimentations, etc

* Scientific methods & behaviour in research laboratory
Students are expected to improve their use of objective, analytical approaches in the definition of scientific questions and the formulation and testing of hypotheses. They will learn how to use laboratory notebooks and the importance of the notions of traceability and repeatability of their work. They are also expected to learn how to improve their ability to be concise, direct and pertinent when communicating

Description

* Ethics & scientific integrity
The course aims to give to the students an overview of ethics questions related to agriscience. During the course, we propose students to think about real situations they could meet during their career. In small groups of 3 or 4, students will discuss the situations, and propose a solution to the class, with main advantages and drawbacks. Teacher then presents the ethical problems linked to this situation.

* Scientific methods & behaviour in research laboratory
The 7 steps of the scientific method (Define the problem; develop hypothesis, design exp, test hypo, organize data, identify variables, draw conclusion, disseminate)
Why and how science is communicated :
- General considerations / Scientific content / General format / Arrangement of information on the slides / Presentation of data / Delivery / Answering questions / Further issues
Making better posters (I show a video - or ask them to watch it beforehand which they usually do not do)
The purpose of a lab book (assure the main foundations of Quality in research, i.e. traceability and repeatability) and how to use a lab book.

Different forms of written communication of science (~12 different forms including articles, posters, blogs, lab books, etc)
The publication process (what are the economic models, what is Open Access)
Using digital tools for bibliographic research
AI software tools and platforms that are specifically designed to aid scientific research across various disciplines

Travail attendu

* Ethics & scientific integrity
Students should take notes during the course. Documents will be provided

* Scientific methods & behaviour in research laboratory
Reading scientific papers, oral presentations, written reports

Modalités de contrôle des connaissances

* Ethics & scientific integrity
Written report 100% 1H30
1 common exam of 45 min: document analysis

* Scientific methods & behaviour in research laboratory
Oral presentation 50% 1H30
Written report (writing a scientific article, describing the writing process) 50% 1H30

Prérequis

This course is addressed to all M1 students in agricultural sciences, with no particular prerequisites

Compétences acquises

- Understand the difference between ethics and integrity
- Know how to behave when facing some common situations in agriscience
- Be aware of some of today debates about bioethics

Références bibliographiques et ressources numériques

1. Entwistle VA, Carter SM, Cribb A, McCaffery K (July 2010). "Supporting patient autonomy: the importance of clinician-patient relationships". Journal of General Internal Medicine. 25 (7): 741?745. doi:10.1007/s11606-010-1292-2.
2. Orfali K, de Vries R (2021). "Bioethics". The Wiley Blackwell Companion to Medical Sociology. John Wiley & Sons, Ltd. pp. 82?101. doi:10.1002/9781119633808.ch5.
3. Wickson, Fern (December 2014). "Environmental protection goals, policy & publics in the European regulation of GMOs"
4. World Health Organization. "Frequently asked questions on genetically modified foods"

S-E02-0703 - ECUE 3 EXTRACT INFORMATION FROM A LARGE DATASET WITH MULIVARIATE STATISTICAL ANALYSIS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	ANNA MELNYKOVA	20h00 - CM : 09h00 TDI : 11h00	Semestre 1

Objectifs

The cours consists of 3 parts, covering dimensionality reduction techniques (PCA), clustering (hierarchical and k-means), as well as classification (logistic regression, k Nearest Neighbors and Linear Discriminant Analysis).

Description

Travail attendu

The students will have practical assignments on each part of the cours, all of them to be done in R language. In the end, they will be evaluated on their written assignment, as well as a data analysis report.

Modalités de contrôle des connaissances

1 devoir sur table 1H coeff 0,5
1 rapport étude de cas (AMS) 1H, coeff 0,5

Prérequis

Refresher cours in statistics and probability, held early in semester.

Compétences acquises

Do an overview of a provided database, learn the relationships between the variables, use statistical analysis to draw the insights from data, classify, sort and visualize the observations.

Références bibliographiques et ressources numériques

Will be provided

S-U02-4552 - UE 2 MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
7.00	8.00	MARC BARDIN	67h00	Semestre 1

Objectifs
MASTER THE FUNDAMENTALS OF THE PRIMARY DISCIPLINES TO CONDUCT A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH

Description
See
ECUE 1 MASTER FUNDAMENTAL OF PLANT HEALTH (PART1 FUNDAMENTALS)
ECUE 2 MASTER FUNDAMENTAL OF ECOLOGY, EVOLUTION & GENETICS
ECUE 3 UNDERSTAND FOOD QUALITY ATTRIBUTES AND THEIR CHANGES TO IMPROVE SENSORIAL NUTRITIONAL FEATURES

Travail attendu

Modalités de contrôle des connaissances
see the specific assessment procedures for each of the ECUE that make up the EU.

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0704 - ECUE 1 MASTER FUNDAMENTAL OF PLANT HEALTH (PART1 FUNDAMENTALS)

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	MARC BARDIN	15h00 - CM : 15h00	Semestre 1

Objectifs

At the end of the course students are expected to know examples of diseases of plants caused by bacteria, fungi, oomycetes, viruses and viroids as well as the major traits that distinguish these different types of organisms. They will learn where to find information about causes of disease, the important environmental factors that are favorable for disease and the available methods of control. They will also understand the importance of knowledge about the ecology of plant pathogens for developing methods of control that reduce the amounts of synthetic pesticides used in disease management.

Description

The objective of this course is to provide students with an introduction to the basic concepts of Plant Pathology and plant health management. Students will learn 1) the definitions of plant disease/plant health and the principles of etiology, 2) concepts concerning disease epidemiology and 3) strategies of disease management. They will also become familiar with the full array of microorganisms that can cause harm to plants including bacteria, fungi, viruses and viroids. The course will include a series of lectures providing the basics of plant pathology and homework where the students will prepare and give a talk on the main phytosanitary problems encountered on cultivated plants.

Travail attendu

Attendance of class is mandatory. Students are expected to participate in discussions during class. Students will also prepare and deliver (to the class) a 20-minute presentation on the etiology, epidemiology and control methods of a phytosanitary problem of cultivated plants

Modalités de contrôle des connaissances

Devoir sur table 2H coeff 0,5
Présentation oral 1H coeff 0,5

Prérequis

Undergraduate level courses about the fundamentals of plant biology, microbiology and agronomy.

Compétences acquises

Good skills in oral and written English. Background in plant biology and microbiology equivalent to the first two years of undergraduate level training (2 years after highschool) ad minima.

Références bibliographiques et ressources numériques

All reference materials will be available on the EDT platform of Avignon University

S-E02-0705 - ECUE 2 MASTER FUNDAMENTAL OF ECOLOGY, EVOLUTION & GENETICS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	MORGANE ROTH	15h00 - CM : 15h00	Semestre 1

Objectifs

Ecology, evolution and genetics are disciplines that allow understanding major biological processes across different timescales. Mobilizing this knowledge is crucial when it comes to environmental or agricultural problematics. The objective of this course is to familiarize students with the nature and origin of biological diversity on Earth and, in particular, the processes of diversification on which plant breeding and emergence of plant diseases and pests are based. At the end of the class students will get familiar with the complexity of biological systems through the lens of the three disciplines and they should be able to identify in scientific literature/studies the biological forces shaping biodiversity at different scales (from micro-organisms to plants, from individuals to ecosystems). This course will provide the basic knowledge that will facilitate understanding of courses in the M2 program.

Description

The course is divided into 4 parts : 1) the timeline and evolutionary origins of life on Earth with a focus on terrestrial plants, microorganisms and insects, 2) the fundamental forces of evolution that lead to diversification and speciation, 3) the specific processes of speciation in plants and 4) the ecological traits of cropping systems that foster the co-existence of species and the dynamics of their populations.

Travail attendu

Part 1 and 2 will require the preparation of 10-minute oral presentations (one per semester)

Modalités de contrôle des connaissances

Type (devoir sur table, étude de cas, QCM, etc. ou AMS)
AMS Case studies of evolution history of plants and microorganisms (oral presentation) 33% 2H
AMS Mettre en pratique les connaissances acquises dans la partie sur les mécanismes d'évolution des plantes à l'aide d'un exemple précis, et en lien avec l'agriculture (oral presentation) 33% 2H
Devoir sur table Tester les connaissances acquises dans l'ensemble des cours de cette UE 34% 2H

Prérequis

Good level in English (reading, writing, speaking), sufficient background in biology (> highschool level)

Compétences acquises

Improved capacity to read scientific reading literature objectively, fundamental and integrative biology, capacity to participate in multidisciplinary activities

Références bibliographiques et ressources numériques

All the material will be provided in the class via the ENT

S-E02-0706 - ECUE 3 UNDERSTAND FOOD QUALITY ATTRIBUTES AND THEIR CHANGES TO IMPROVE SENSORIAL NUTRITIONAL FEATURES

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
1.00	1.00	LEA VERNES	16h00 – CM : 08h00 TDI : 04h00 TP Semestre 1 : 04h00	

Objectifs

Competency: understand food quality attributes and their changes depending on both conventional and innovative food processing and storage technologies to improve the sensorial and nutritional characteristics of plant food.

Description

Understand how food and nutra ingredients are produced. What are the main extraction techniques and solvent used in the food industry to produce ingredients? What are the main parameters and how to control/improve them? How to select the raw material (fruit/vegetables, botanicals) before the extraction? How to characterize the final extract? What are the different drying methods used to dry extracts? What are the main food and nutra applications for these ingredients?

Travail attendu

Modalités de contrôle des connaissances

Examen avec 2 questions ouvertes (1 pour « Heat treatment of plants » et 1 pour « Plant fermentation processes » ; chaque partie sera corrigée par le responsable du cours. Coeff 50% 2H
Examen sur les procédés d'extractions Coeff 50% 2H

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-E02-0707 - ECUE 4 MASTER THE MAIN CLASSES OF FOOD COMPONENTS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	3.00	GERALD CULIOLI	21h00 - CM : 21h00	Semestre 1

Objectifs

Master basic understanding of chemistry to be able to define a natural product. A brief description of some of the functions and applications of these molecules is given.

FUNDAMENTAL OF FOOD SCIENCES

- 1- Describe the characteristics of various food groups, including their chemical composition, their structure, and classes of nutrients
- 2- Describe the main channels/methods of food production, preservation and distribution based on the characteristics of raw materials and the desired characteristics of the final food products

Description
Description
CHEMISTRY OF NATURAL PRODUCTS

This course is divided in 3 parts. The main definitions useful in the field of natural products chemistry (e.g. primary/central vs secondary/specialized metabolites) will be developed in a brief introduction. The second part will be devoted to the description of the main classes of natural products on the basis of the biosynthetic pathways (acetate, shikimate, mevalonate ?) which allow the production of such chemical compounds. This course will end with a brief inventory of the different ecological roles played by natural substances in the environment.

FUNDAMENTAL OF FOOD SCIENCES

This course will address the basic principles of food science, covering the four core disciplines of food science : food chemistry, food processing, food microbiology, and sensory science. Food chemistry will be addressed through basic biochemistry of the main classes of nutrients and their analysis (lipids, proteins, carbohydrates, water and minor food constituents), and applied to common food groups (cereals, dairy products, fruits and vegetables, etc.). Food processing and microbiology will be addressed through their fundamental principles and their applications to food preservation. Finally, sensory science will be addressed through its two main components, texture and flavor, and connections will be established with concepts of food biochemistry, showing how structure and physical/chemical properties of food constituents affect texture and flavor. The overall approach of this course will be integrative and will strive to make links between molecular properties of food constituents and properties of food itself.

Travail attendu
CHEMISTRY OF NATURAL PRODUCTS

Have a good knowledge of the course.

By means of the examples that will be provided, practice finding the biosynthetic origin and, in fact, the chemical class of a natural product via its chemical structure.

Be able to determine the ecological function of a specific natural product.

Modalités de contrôle des connaissances
FUNDAMENTAL OF FOOD SCIENCES

Learning and understanding of course material (exam questions and learning objectives are entirely covered in course material).

CHEMISTRY OF NATURAL PRODUCTS
CHEMISTRY OF NATURAL PRODUCTS

Devoir sur table écrit 1H30 : 80% Knowledge of natural products and the main metabolic pathways and 20% Ecological roles of natural products.

Prérequis
CHEMISTRY OF NATURAL PRODUCTS

Basic knowledge of organic chemistry (main chemical functions, stereochemistry ...) is required

Basic knowledge of biochemistry would be useful.

FUNDAMENTAL OF FOOD SCIENCES

Undergraduate level chemistry, organic chemistry, biochemistry, and biology.

Compétences acquises
CHEMISTRY OF NATURAL PRODUCTS

Define a natural product.

Know the main classes of natural products based on their biosynthetic origin.

Know the analytical tools for studying natural products, in particular be able to interpret spectral data resulting from the analysis of such molecules.

To know a wide range of functions and applications of these molecules.

FUNDAMENTAL OF FOOD SCIENCES

1- Understanding of the nature, composition and structure of the main classes of foods

2- Understanding of transformations of and interactions among food components from raw materials to edible foods

3- Understanding of basic principles of food preservation, food analysis, sensory evaluation and food value-chain

Références bibliographiques et ressources numériques

S-L02-0151 - OPTION AGRONOMY

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
-	-	-	-	Semestre 1

Objectifs
Description
Travail attendu
**Modalités de contrôle des
connaissances**
Prérequis
Compétences acquises
**Références bibliographiques et
ressources numériques**

S-U02-4553 - UE3 MASTER AGRONOMY, PLANTS AND ENVIRONMENT

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	CLAUDE DOUSSAN	30h00 - CM : 18h00 TDI : 12h00	Semestre 1

Objectifs

Objective of the module: to give a general introduction to agronomy/agroecology and some key points of agronomy at the landscape scale. (ii) To give a general introduction to soil with some specific focuses on processes which are the main drivers for the plant water and mineral nutrition.

Description

- Soil: Global soil-related issues, descriptive elements of the soil (composition, texture, structure), soil and water: hydrostatics (water properties, surface tension, capillarity, notion of water potential, retention curve), hydrodynamics (hydraulic conductivity, Darcy's law, Richards' equation), hydrology (calculation of stocks, infiltration, drainage, runoff, evapotranspiration). Associated instrumental techniques. Soil and Biogeochemistry: the organic constituents of soils, the main chemical reactions in soils, physico-chemistry of liquid-solid interface, cycle of mineral elements. Establishment of root systems and their architecture, dynamics of mineral elements in solution, acquisition of mineral elements.

- Agronomy: Introduction to Agronomy: main crops, their relation to environment, main crop managements and the related farming practices. Cropping, farming and land systems, definitions and examples and the different scales of analysis. The Mediterranean context and the analysis of Mediterranean land and farming systems: existing literature and a recent assessment. Current challenges for land/farming system science. The new paradigms: agroecology, sustainable intensification and climate smart agriculture. Landscape agronomy concept

6 hours of tutorials for Agronomy and Soil are planned to apply the principles presented: simple numerical applications or modeling

Travail attendu
Modalités de contrôle des connaissances

Devoir sur table écrit 2H

Prérequis

Mathematics basics (algebra, simple differential equations), notions of fluid dynamics, basics of solution chemistry

Compétences acquises

General overview of soil functions and threats, basic understanding of soil hydrology and soil processes in mineral nutrition, ability to get first order estimation of soil water budget in relation with evapotranspiration, irrigation, drainage.
General understanding of the main typology and management systems of cropping and farming systems, ability on analyzing farming practices and their possible impacts on environmental features. Represent and spatially analyze the farming systems at landscape scale through geographical information systems.

**Références bibliographiques et
ressources numériques**

Slides and courses in pdf format, paper supports, reference books.

S-U02-4554 - UE4 UNDERSTAND INTEGRATED NUTRITION AND METABOLISM OF PLANTS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	LAURENT URBAN	30h00 – CM : 15h00 TDI : 07h00 TP Semestre 1 : 08h00	

Objectifs

The objective for students is to acquire a basic understanding of the way plants function mainly at the cell and organ levels. The focus will be on the major functions determining growth and development: photosynthesis, respiration, water uptake, mineral absorption and assimilation. Students will be introduced to the major pathways of the Carbon and Nitrogen metabolisms and primary and secondary metabolisms. A fair command of these basics elements is expected for they are a prerequisite for the upcoming courses of plant ecophysiology and plant physiopathology, among others.

Description

Photosynthesis : Interception of light energy, photochemical reactions, photosynthetic carbon fixation (C3, C4, CAM), photorespiration, distribution of assimilates, regulation of photosynthetic activity. Water supply (absorption, transport), water state, concept of stress. Interactions between water nutrition and carbon nutrition. Mineral food. Slides available online.

Practical work : Influence of ferti-irrigation management on the growth of vegetable crops and associated physiological parameters : influence of the water status (water and osmotic potentials, water content, transpiration, stomatal conductance) on photosynthesis, respiration and nitrogenous nutrition. The objective is also to master the use of tools such as the pressure chamber (Scholander type), LICOR, nitratecheck...

The lab report is produced in the form of a scientific article.

Plant physiology labwork (10h)

The aim is to make students familiar with the main concepts and common techniques in plant physiology. We will examine how plants survive under environmental stress by modifying their physiology (water and mineral acquisition, photosynthesis).

Travail attendu

In addition to learning basic knowledge about plants major functions, the signaling and metabolic pathways and their regulation, it is expected from students to link these mechanisms to the way they interact and are involved in growth and development.

Modalités de contrôle des connaissances :
two exams are programmed.

Modalités de contrôle des connaissances

Mastery of concepts in plant nitrogen nutrition 33% 1H
Mastery of concepts in plant hydric nutrition 33% 1H
Making a poster presentation in science 17% 1H30
Making an oral communication in science 17% 2H

Prérequis

Basic concepts of plant biology and physiology. Minimal skills in chemistry/biochemistry and physics.

Compétences acquises

Master the major methods and tools of plant physiology.
Recognize nitrogenous molecular family from formulas
Interpret correctly simple experiments from scientific literature about nitrogen assimilation mechanisms
Be able to link stages of the nitrogen cycle to nitrogen nutrition
Be able to summarize their knowledge in precise texts

**Références bibliographiques et
ressources numériques**

Recommended lecture : Plant Physiology, Taiz and Zeiger, Sinauer publisher.
Articles to download from the website of the course.

S-L02-0152 - OPTION FOOD & HEALTH SCIENCES

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire
-	-	-	-

Période
Semestre 1

Objectifs

Description

Travail attendu

**Modalités de contrôle des
connaissances**

Prérequis

Compétences acquises

**Références bibliographiques et
ressources numériques**

S-U02-4555 - UE3 UNDERSTAND PHYSIOLOGY OF HUMAN NUTRITION AND CONSUMERS BEHAVIORS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	PHILIPPE OBERT	30h00 – CM : 22h00 TDI : 04h30 TP Semestre 1 : 03h30	

Objectifs

FUNDAMENTALS OF HUMAN NUTRITION

Be able to implement a project aimed at improving human health using nutritional approaches based on fruit and vegetable consumption, with a focus on micronutrients and phytochemicals

Description

CONSUMER SCIENCES

Be able to Analyze and interpret consumer data related to nutrition and behavior

FUNDAMENTALS OF HUMAN NUTRITION

- Master the physiological mechanisms involved in the digestion of nutrients and other bioactive compounds in humans, from taste perception to the digestive process

CONSUMER SCIENCES

Data on consumer data related to nutrition and behavior

Travail attendu

FUNDAMENTALS OF HUMAN NUTRITION

Reading scientific papers, oral presentations

CONSUMER SCIENCES

Reading scientific papers, oral presentations

Modalités de contrôle des connaissances

FUNDAMENTALS OF HUMAN NUTRITION

Written exam 50%

Report (make the summary from a scientific paper) 50%

CONSUMER SCIENCES

Written exam 100%

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4556 - UE4 BE ABLE TO IDENTIFY AND CLASSIFY DIFFERENT TYPES OF MICRO-ORGANISMS AND EXPLORE THEIR ABILITY TO CARRY OUT BIO-

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	CATHERINE DUPORT DIT ROUSSEAU	30h00 – CM : 10h30 TDI : 09h00 TP Semestre 1 : 10h30	

Objectifs

Be able to identify and classify different types of micro-organisms (bacteria, fungi, viruses, archaea) and explore their ability to carry out bio-transformations, including metabolic processes that convert phytochemicals

Description

The Microbiome and Soil Enzymology teaching unit focuses on the following points:

- Be able to identify and classify different types of micro-organisms (bacteria, fungi, viruses, archaea) and explore their ability to carry out bio-transformations, including metabolic processes that convert phytochemicals
- Understand the diversity of the microbial world, soil microbial ecosystems and bio-transformations, and the fate of pathogens in the environment. The labworks deal with enzymology and the microbiological study of a soil on the one hand, and the microbiological characterization of a food pathogen on the other.

Travail attendu

Modalités de contrôle des connaissances

Present orally a bibliographical review 40% 2H30
Write a bibliographic review 40% 2H30
Restitution of experimental work 20% 2H30

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4557 - UE5 BE ABLE TO COLLECT, ANALYZE, AND INTERPRET DATA AS WELL AS CONDUCT IN-DEPTH LITERATURE REVIEWS FOR A LABORATORY

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
6.00	6.00	-	60h00 – TDI : 60h00	Semestre 1

Objectifs

- Mobilize the knowledge and skills acquired previously and during training to respond to upstream problems posed by a research unit.

Description

Travail attendu

Modalités de contrôle des connaissances

Written report (50%) plus oral presentation (50%)

Prérequis

Compétences acquises

Références bibliographiques et ressources numériques

S-U02-4558 - UE6 CONFERENCE CYCLE

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
1.00	1.00	-	06h00 - CM : 06h00	Semestre 1

Objectifs**Description****Travail attendu****Modalités de contrôle des
connaissances****Prérequis****Compétences acquises****Références bibliographiques et
ressources numériques**

S-U02-4559 - UE7 FRENCH FOR BEGINNERS

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
1.00	1.00	-	60h00 - TDI : 60h00	Semestre 1

Objectifs**Description****Travail attendu****Modalités de contrôle des
connaissances****Prérequis****Compétences acquises****Références bibliographiques et
ressources numériques**

**S-U02-4560 - UE 1 UNDERSTAND TOXICOLOGY DEFINITION AND
CONTAMINATION OF PLANT PRODUCTION BY TOXIC SUBSTANCES**

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	-	25h00 – CM : 15h00 TDI : 10h00	Semestre 2

Objectifs**Description****Travail attendu****Modalités de contrôle des
connaissances****Prérequis****Compétences acquises****Références bibliographiques et
ressources numériques**

**S-U02-4561 - UE 2 MASTER FRUITS AND VEGETABLE PROCESSING AND
CONSEQUENCES ON THEIR QUALITIES**

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	-	21h00 - CM : 16h00 TDI : 05h00	Semestre 2

Objectifs**Description****Travail attendu****Modalités de contrôle des
connaissances****Prérequis****Compétences acquises****Références bibliographiques et
ressources numériques**

S-L02-0155 - CHOOSE 1 OPTION

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
-	-	-	-	Semestre 2

Objectifs
**Description**
**Travail attendu**
**Modalités de contrôle des
connaissances**
**Prérequis**
**Compétences acquises**
**Références bibliographiques et
ressources numériques**


S-U02-4562 - UE 3 UNDERSTAND THE ESSENTIALS OF BIOCLIMATOLOGY, SOIL PHYSICS AND BIOGEOCHEMISTRY (PART 1).

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	-	24h00 – CM : 16h00 TDI : 08h00	Semestre 2

Objectifs**Description****Travail attendu****Modalités de contrôle des connaissances****Prérequis****Compétences acquises****Références bibliographiques et ressources numériques**

S-U02-4563 - UE 3 MASTER MICROBIAL CLASSIFICATION, BIO-TRANSFORMATIONS, AND PHYTOCHEMICALS IN PLANTS PROCESSING AND

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
4.00	4.00	-	24h00 – CM : 18h00 TDI : 06h00	Semestre 2

Objectifs**Description****Travail attendu****Modalités de contrôle des connaissances****Prérequis****Compétences acquises****Références bibliographiques et ressources numériques**

S-E02-0708 - ECUE1 BE ABLE TO IDENTIFY AND CLASSIFY DIFFERENT TYPES OF MICRO-ORGANISMS AND EXPLORE THEIR ABILITY TO CARRY OUT BI

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	-	12h00 - CM : 09h00 TDI : 03h00	Semestre 2

Objectifs**Description****Travail attendu****Modalités de contrôle des connaissances****Prérequis****Compétences acquises****Références bibliographiques et ressources numériques**

**S-E02-0709 - ECUE2 MASTER PHYTOCHEMICALS IN FRUIT AND VEGETABLE
 PROCESSING AND GASTROINTESTINAL DIGESTION**

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
2.00	2.00	-	12h00 - CM : 09h00 TDI : 03h00	Semestre 2

Objectifs

Description

Travail attendu

**Modalités de contrôle des
connaissances**

Prérequis

Compétences acquises

**Références bibliographiques et
ressources numériques**


S-U02-4564 - UE 4 CONFERENCE CYCLE

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
1.00	1.00	-	06h00 - CM : 06h00	Semestre 2

Objectifs**Description****Travail attendu****Modalités de contrôle des
connaissances****Prérequis****Compétences acquises****Références bibliographiques et
ressources numériques**

S-U02-4565 - UE 5 IMPLEMENTING AND EVALUATING A PROJECT LINKED TO AGRICULTURE, FOOD AND HEALTH (AMS, INTERSHIP INCLUDED)

Crédits ECTS	Coefficients	Enseignant-e responsable	Volume horaire	Période
17.00	17.00	-	10h00 - TDI : 10h00	Semestre 2

Objectifs**Description****Travail attendu****Modalités de contrôle des connaissances****Prérequis****Compétences acquises****Références bibliographiques et ressources numériques**