UniLaSalle Rennes | École des métiers de l'environnement

Dear Partners

UniLaSalle Rennes will be able to propose the follow courses and research project in the spring semester (early February to early June) of the 2023/2024 school year. Students will be able to sign up for up to 20 ects of Environmental Science courses, and up to 10 ects on a research project for a member of the UniLaSalle-Rennes research team (Cyclann). 1 ects of French lessons is also available on the Rennes campus.

When students apply for the semester at UniLaSalle -Rennes, they will send their CV and a description of what kind of laboratory or research work that they are willing and able to do. If the skill set of each student is acceptable, the theme and content of the research project will be defined by the Cyclann research team,

Topics that interest the Cyclann team are in the domains of environmental engineering and science, water and effluent quality, effluent and waste treatment and environmental assessment.

This program is adapted for students who have completed 2 or 3 years of higher education in environmental science or related domains. Students should have at least a B2 level in English so they can take active part in course and project work. French language skills are not necessary for this program but are helpful for everyday life in France.

Here are the spring 2024 course titles, you will find details about each course in the following pages.

Code	Title	ects
MA_EC_UE1	Eco-design and Circular Economy	**4**
MA_EC_UE2	Eco-design beyond Product	**4**
MA_EC_UEP	Eco-design and Circular Economy Project	**4**
MIB2 DEE	Evaluating and anticipating the impacts of human activities on territories using modeling approaches	**4**
Choose one or the other:		
MIB3	Laboratory tools for ecotoxicological evaluation	**4**
Or		
MIB3	Introduction to Climatology, Water cycle and Transport processes in the Environment	**4**
Research	Research Project	**Up to 10**
French	French as a foreign language (optional)	**1**

There are a limited number of places for exchange students, we will accommodate as many as possible. If you need more information about these courses, or about life on the UniLaSalle-Rennes campus, please get in touch with me. We hope to see your students here in Rennes!

Best regards,

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MA_EC_UE1 Eco-design and Circular Economy 4 ects

Value Analysis
Eco-design Process
LCA applied to Eco-design
Non LCA Tools for Eco-design
Engaging Internal Partners for Eco-design
Environmental Communication
Introduction to Industrial Symbiosis

Learning Objectives

Upon completion of this minor, students will be able to:
Value analysis: Understand the need for a functional approach to a product or service. Be able to actively participate in the development of functional specifications.
Eco-design: Distinguish and compare the different eco-design tools. - Develop an eco-design approach in a company.
Environmental communication: Promote the results of an eco-design approach in a transparent and robust manner.
Industrial ecology: Implement the principles of industrial and territorial ecology, design solutions for industrial and territorial synergies.

Course contents

Value analysis: Definition and terminology of the value analysis, The value analysis approach (Orientation, Search for information,
Functional analysis: Functional specifications, Hierarchization and valuation of functions, Cost of functions, Comparison of values and costs)
Eco-design approach: Context: principles of eco-design, Application of life cycle analysis to eco-design (tools other than SimaPro: Product balance, MET, ESQCV, Material and energy balance),
Eco-design tools (Eco-design pilot, Check list, Blacklist, Material list, Systemic analysis, Sector guide), Stages of a company approach
Environmental communication: Avoiding green washing and using life cycle analysis in environmental communication. Difference between LCA applied to design and applied to communication.
Industrial and territorial ecology: Context and issues of industrial and territorial ecology. Strategies of eco-restructuring,

MA_EC_UE2 Eco-design beyond Product **4 ects**

New Business Model for the Circular Economy
Design for Sustainable Behavior
Eco-innovation
LCA applied to Innovation
Low Tech and New Models for Growth
Introduction to Product Affordance
Rebound Effect

Learning Objectives

Upon completion of this minor, students will be able to:
Navigate through the different approaches related to eco-design with a focus on circular economy strategies and its new economic models (economy of functionality, repair, reuse, recycling, product life cycle, eco-design, eco-innovation, waste hierarchy and low-tech, design for sustainable behavior ...)
Understand the stakes and the means to evaluate and valorize a circular economy strategy.
Learn about the tools of industrial and territorial ecology.

Course contents

Circular economy: from a linear model of "Take-Make-Dispose" to a circular model based on life extension, repair, renting, reuse, synergy of abiotic and biotic circles in the production of materials and energy.
- Eco-innovation: Introduction to innovation and ideation tools (Brainstorming, Mind-mapping, inspiration by examples: Eco-triz), Integration of life cycle thinking in a radical innovation project, Biomimicry, and symbiotic economy.
- Design for Sustainable Behavior: how a product can be an object of transition towards more sustainable behaviors. Introduction to the design of everyday things and to the use script of products and to the strategies of design for sustainable behavior (eco-feedback, behavior steering...)
- Low tech and change in our economic growth models*.
- The challenges of environmental assessment of innovative eco-design strategies: exploration by example of the challenges of building a life cycle model for an innovative technology with a specific focus on the allocation of end-of-life impacts of products / new life cycles.
- Rebound effect: how to ensure that the estimated environmental performance is actually achieved?
- Reuse of products containing chemical contaminants (monitoring, regulation, toxic effects in new environments?)

MA_EC_UEP Eco-design and Circular Economy Project 4 ects

Learning Objectives

Upon completion of this minor, students will be able to:
UE1: Produce a functional tree of a basic product; LCA and eco-design of the product; Environmental communication plan; stakeholder involvement plan.
UE2: Apply at least one of the 5 concepts to the product and propose a prototype and its scenario of use in the form of a comic strip.
Delivery of the UE Project: A booklet of comic strips concerning product changes.

Course contents

Choice of a simple product on which the different elements of the course will have to be implemented.
1) Build the functional tree of a product
2) Carry out the life cycle analysis of the product to initiate the eco-design approach
3) Use of eco-design tools on the product
4) Refine the life cycle analysis in order to make environmental communication
5) To recommend an approach for the transverse integration of eco-design in the company that designs the product
6) Apply at least one of the 5 concepts of the UE 2 to its product and propose a prototype and prototype and its scenario of use in the form of a comic strip (https://bdnf.bnf.fr)

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MIB2 DEE Evaluating and anticipating the impacts of human activities on territories using modeling approaches 4 ects

Learning Objectives

At the end of this minor, students will be able to:

• Identify areas sensitive to pollution in relation to current or future activities by mapping (GIS)

• Understand the different models that can be used to assess he emission of pollutants (associated with the use of monitoring networks) and their dispersion in the environment

• Identify the toxic potential of compounds based on their classification and using a database (USETox)

Course contents

Diversity and variability of origins and exposures to contaminants related to human activities

Emission and fate of pollutants in the environment

Mapping of pollution-sensitive areas: GIS project with an external contributor

Modeling the dispersion of pollutants in air, soil, and water

Modeling of human toxicity and ecotoxicology

Evaluation of the effects of compounds according to their classification

Choose one or the other

MIB3 Laboratory tools for ecotoxicological evaluation **4 ects**

Evaluating and Anticipating the Impacts of Human Activities on Territories using Modeling Approaches

Modelling of Pollutants Toxicology

GIS Pollution Diagnosis Planning

Learning Objectives

Upon completion of this minor, students will be able to:

• Know the different ecotoxicological analysis tools (standardized tests, well known and innovative biomarkers, modelling)

• Select the best strategy and methodology to implement according to the context and the scientific question

• Identify the advantages and disadvantages of each tool

• Communicate the results in different forms

Course contents

Ecotoxicological assessment:

Knowledge and use of regulatory tools such as standardized monospecific tests

Contamination analysis:

-immediate immobilization test and mortality of daphnia magna

- germination inhibition test

Understanding the mechanisms of toxicity and development of early measures:

Knowledge and use of classical biomarkers (biochemical and cellular measurements) and of more innovative tools (modeling using databases)

- measurement of an oxidative stress biomarker (dissection, protein assay and measurement of enzymatic activities related to oxidative stress)

- measurement of a genotoxicity biomarker (comet test)

Group Project: Based on a case of contamination, evaluate the strategy to be adopted to measure the ecotoxic effects (the contaminant will be known or not, alone or in a chemical cocktail): the type of test to be performed with the selected protocol.

or

MIB3 Introduction to Climatology, Water cycle and Transport processes in the Environment 4 ects

Learning Objectives

By the end of this minor, students will be able to:

• Understand the basic principles of climatology including the earth energy balance and its importance in atmospheric dynamics

• Analyze the hydrological conservation principles by identifying and evaluating the various terms of the water balance equation including precipitation, evaporation, surface/subsurface flow as well as snowpack and snowmelt

• Understand solute transport processes in surface/subsurface waters as well as in the air

• Conduct a simple hydrological model using computer tools

Course contents

Part 1 - Climatology and Meteorology (Solar radiation and Earth's energy balance; Principles of meteorology: the earth-atmosphere system; Extreme weather; Greenhouse effect and global warming)

Part 2 - Water Cycle (Precipitation and evapotranspiration; Subsurface water; Surface water; Unit Hydrographs; Flow routing; Software application HEC-HMS; Snow)

Part 3 - Chemicals fate and transport in the environment (Overview and review of basic chemistry; Transport in subsurface waters; Transport in surface waters; Transport in air)

Research Project

Research Project — up to 10 ects

Learning Objectives

By the end of this research project, students will be able to:

- Conduct scientific experimentation,
- Deepen knowledge and put into practice certain processes and techniques
- Acquire basic skills of team project management
- Analyze results ...
- Handle concepts of process control, eco-design, environmental impacts, ecotoxicology, prevention of pollution and the energy performance of buildings...

Course contents

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Topics that interest the Cyclann team are on environmental engineering and science, water and effluent quality, effluent and waste treatment and environmental assessment...

Deliverables

For a **5 ECTS project**, here is what we can expect the students to produce (in about 125 hours):

A Written Report, - 10 to 15 pages per student, with 1.5 spacing, a standard 12-point font, justified due by end of May 2024

Synthesis and Sources – a Synthesis between 300 and 400 words per student, at least 30 scientific and technical sources

PowerPoint Presentation - in early June 8 to 10 slides per student

Meetings between students and supervisors should be set up directly with supervisor – students are responsible for this.

Grading of report & Presentation: Based on quality of the synthesis and pertinence of literature, quality of introduction and conclusion, depth of scientific study, quality and depth of thinking and writing.