

2018/2019

**Masters in Environmental Engineering
Courses taught in English - 1st year - **Fall Semester****

September through December	ECTS	Semester 7A Course Titles
Life Sciences S07A_SC_VIE	6	Compost Processes
		Ecotoxicology
		Microbiology
Environmental Engineering S07A_GIE	6	Solid Waste Management
		ICPE Facility Regulations (optional) in French
		Environmental Management
		Water Treatment Networks
Languages S07A_LANGUES	3	English
		English Project or Spanish or German
Environmental Impact Assessment CR 502E	6	Environmental Impact Assessment Methodology
		Life Cycle Assessment
		Environmental Impact and Indicators
Energy Issues and International Sustainable Regulations CR 506E	6	Best Available Technologies
		Energy Issues
		Environmental Law Associated to Industries
		Actors and Regulations
Project S07A_TRAV_PERS	3 to 6	Environmental Science Project

Course code: 18_ING_S07A_COMPOSTAGE **Teacher:** LORANS Anne

Semester: Semester 7

Module: Life Sciences

Course title: Compost Processes

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
3	3					15	

Course prerequisites:

Basic knowledge in Microbiology, and Biochemistry

Course objectives:

To learn knowledge about composting process, related with regulation

Learning outcomes:

To be able to analyze composting process, to know involved microbial and biochemical mechanisms, to interpret rules, to design and to monitor physical chemical parameters

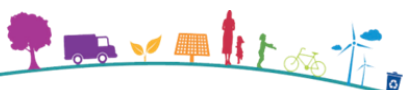
Course content:

Transformation of organic compounds in soils and composts

Principles, main stages, and parameters of composting

Composting process

Nuisances caused by composting Regulation



Course code: 18_ING_S07A_ECO_TOX **Teacher:** LORANS Anne

Semester: Semester 7

Module: Life Sciences

Course title: Ecotoxicology

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
7.5	1.5						

Course prerequisites:

Basic knowledge of toxicology and general ecology

Course objectives:

To know and to understand the adverse effects of pollutants on ecosystems

Learning outcomes:

To be able to analyze the effects of pollutants on ecosystems To be able to understand chemical and biological monitoring

Course content:

- 1- Biosphere pollution: principles, pollutants dispersion, pollutants transfers and biomass contamination, bioconcentration and biomagnification of pollutants
- 2- Ecotoxicity evaluations, principles of ecotoxicity tests, biodegradability tests Eco toxicological Parameters
- 3- Effects of pollutants on ecosystems
 - Biomonitoring of pollutants, bioindicators, biomarkers
- 4- Prediction of pollutants adverse effects on ecosystems



Course code: 18_ING_S07A_MICROBIOLOGIE **Teacher:** LORANS Anne

Semester: Semester 7

Module: Life Sciences

Course title: Microbiology

Coefficient: 2

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
9	0	9					

Course prerequisites:

Basic knowledge in Microbiology, Biochemistry, general ecology

Course objectives:

To learn knowledge about environmental microbiology, and more precisely about sewage and waste biological treatments

To learn principles of microbiological analysis

Learning outcomes:

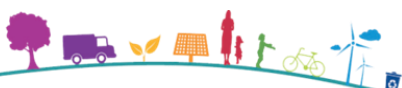
To be able to use microorganisms in biological treatments of water and sewage, soils and waste.

To be able to understand principles of health risk

To be able to make and interpret a microbiological analysis of surface water.

Course content:

- 1- Environmental microbiology: microorganisms, biofilms...
- 2- Air microbiology: microorganisms, aero-bio contamination, quality control
- 3- Soil microbiology: microorganisms, biodegradations, bioremediation
- 4- Water microbiology: Microorganisms, self-purification, microorganisms of fecal contamination, principles of analysis
- 5- Microbiology of activated sludge



Course code: 18_ING_S07A_DECHET **Teacher:** HENRION Thierry

Semester: Semester 7

Module: Environmental Engineering

Course title: Solid Waste Management

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
9	3						

Course prerequisites:

None

Course objectives:

This module should allow the student to:

- Know the various waste treatment channels.
- Understand industrial practices.

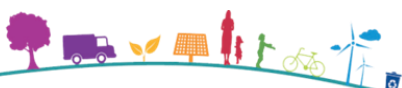
Learning outcomes:

At the end of the course, the student must be able to:

- Describe waste treatment pathways
- Discuss industrial practices and their evolutions Analyze waste treatment issues.
- Evaluate possible strategies for waste treatment

Course content:

- Course 1 Recycling (Technical and Regulatory Aspects) General introduction to the course, Vocabulary and definition, Recycling: Technical aspects (Selective collection, pneumatic, inert waste) Recycling: Economic and Regulatory Aspects
- Course 2: Biological treatment (technical and regulatory aspects) Agronomic valorization and spreading, Composting Methanisation, Mechanical-Biological-Treatment
- Course 3: Energy recovery (Technical and regulatory aspects) Incineration of non-hazardous waste: techniques Energy, by-products, waste, Other energy treatment (pyrolysis, RDF ...)
- Course 4: Non-Hazardous Waste Storage Center (Technical and Regulatory Aspects) Construction principles Management, Biogas and leachate management
- Course 5: Hazardous waste treatment, Recycling (some examples), Heat treatment Stabilization and Storage
- Course 6: Treatment of polluted soils Containment, Leaching Biopile, Heat treatment
- TD 1: Mapping of household waste treatment systems from a city
- TD 2: Landfill or incineration? Current situation / Comparison of sectors / Perspectives



Course code: 18_ING_S07A_ICPE **Teacher:** HENRION Thierry

Semester: Semester 7

Module: Environmental Engineering

Course title: ICPE Facility Regulations (**Taught in French** - Optional for Erasmus)

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
1.5	1.5						

Course prerequisites: French environmental regulations basics

Course objectives:

This module aims at making students understand what an Installation Classified for the Protection of the Environment (ICPE) is. They learn the general regulatory context and find out about the various classification plans. They can use the specifications for classified facilities and help build a case for an application to obtain an operating license in the scope of Facilities Classified for Environmental Protection (ICPE).

Learning outcomes:

The students know the different documents composing a case for an application to obtain an operating license and the administrative process for an application to get an operating permit to the Prefecture. They know the composition of an Environmental Impact Study and from the Hazard Assessment. They can identify the potential headings of an ICPE categorization out of technical data from a company and offer a registration to the authorization and declaration departments.

Course content:

Introduction of the module and groups distribution

Personal work

Feedback 1 Objective: knowing the definition of a French Installation Classified for the Protection of the Environment, the regulatory context – understanding the various classificatory schemes – getting to know what an ‘Application to obtain an operating License’ is composed of and what the application process from the Prefecture is – knowing what an impact and hazard study is

Personal work

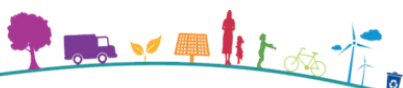
Feedback 2 (in French for French students, **optional for ERASMUS students**)

Objective: to create an ‘Application to obtain an operating License’ table from a case study using the French nomenclature.

Resources: case study document - nomenclature

Feedback 3 (by ERASMUS students) Objective: international culture: getting to know the international regulations equivalent to Installations Classified for the Protection of the Environment in the home countries of the ERASMUS students

Resources: found by the students - discussion forum



Course code: 18_ING_S07A_MNG_ENV **Teacher:** HENRION Thierry

Semester: Semester 7

Module: Environmental Engineering

Course title: Environmental Management

Coefficient: 2

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
6	6						

Course prerequisites:

None

Course objectives:

Knowledge of the major elements of ISO 14001 and EMAS, their interest in organizations and the principles of continuous improvement.

Learning outcomes:

To be able to understand the interest of a management system for the company, to know the vocabulary and requirements of the ISO14001 and EMAS. At the successful completion of this course, students will be able to help a supervisor to implement an environmental management system

Course content:

Course 1 Environmental Management System: Principles

The EMS: definition History and main texts Why an EMS
The main principles PDCA: Plan Do Check Act

Course 2 ISO 14001

The standard ISO 14001 and its principles
Environmental Policy / Planning / Implementation / Monitoring / Management Review
SMI and ISO 14 001 Certification

Course 3: EMAS (Eco Management and Audit Scheme)

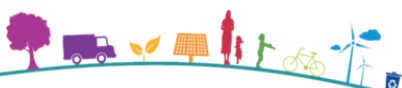
Principles EMAS / ISO 14001 comparison Establishment of EMAS Environmental audit
Environmental statements Environmental Auditing Registration

Course 4: Environmental analysis

The first stage of certification
Step 1: Collecting global data
Step 2: Description of activities, products and services;
Step 3: identification of impacts (normal, transient, degraded and accidental)
Step 4: Scoring and ranking criteria.

Case Study: Developing an Environmental Audit

TD1 Presentation of the company "test"
Compilation of aggregate data and description of activities
TD2: Identification of impacts
TD3: Quotation and prioritization
TD4: ISO 14000 applied to the EME: how to initiate the process (Structuring and actor of the points
Environmental policy / Planning / Implementation / Control / Management review



Course code: 18_ING_S07A_RESEAUX Teacher: DESHAYES Steven

Semester: Semester 7

Module: Environmental Engineering

Course title: Water Treatment Networks

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
9	3						

Course prerequisites:

Fluid mechanics, characteristics of drinking water (DW) and wastewater (WW)

Course objectives:

To know the problems related to the drinking water networks and to the sewers

Learning outcomes:

Identify materials and main components of networks.

Understand the basics (pressure, flow) of drinking water sizing, and the operating indicators

Know the self-cleaning rules, understand the installation, maintenance and renovation of DW/ WW networks

Course content:

Lesson and E-lesson:

drinking water networks: structure, components, sizing bases.

drinking water networks: leaks, health disorder, monitoring and network performance indicator drinking water supply.

DW/ WW networks: components and rules self-cleaning.

DW/ WW networks: installation, maintenance, rehabilitation. The factors of durability of networks

Alternative technics to the rainwater network Tutorial classes:

Case study of drinking water (dimensioning of a network extension) or waste water (drawing up a synoptic summary of an existing study)



Course code: 18_ING_S07A_ANGLAIS POMMET Nelly

Semester: Semester 7

Module: Languages

Course title: English

Coefficient: 2

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
	21					9	

Course prerequisites:

Post High School English level B2

Course objectives:

To prepare students for oral communication on environmental, technical, and scientific topics

To enhance students' general English including fluency, oral comprehension, writing, vocabulary and grammar

To prepare students for coping with the demands of studies in English at their Erasmus+ destination

To enhance students' awareness of the TOEIC test

Learning outcomes:

By the end of this module, students should be at a good B2 level and be able to:

cope adequately with academic oral activities such as group discussion, tutorials, understand and use a range of techniques for giving oral presentations

extract the general meaning and detailed information from a range of reading texts

converse at a good level on a wide range of general topics, and speak English acceptably

have accurate pronunciation, give a nine-minute oral presentation

handle structures, functions, notions and vocabulary with acceptable accuracy

write with minimal errors in usage

Course content:

Listening and speaking activities Current events & General vocabulary

Review of sentence structure & grammar Listening & reading comprehension Pronunciation

2 sessions in computer labs

Presentations & discussions about scientific and technical issues Presentations of course content of

Erasmus+ destinations

Self study from TOEIC Book Lin Lougheed

Other sessions will be defined according to the level of each group



Course code: 18_ING_S07A_ANGLAIS_PROJET **Teacher:** HULL Thomas

Semester: Semester 7

Module: Languages

Course title: English Project

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
1.5						12	

Course prerequisites:

Basic High School English level

Course objectives:

Be able to write and give a clear report about an environmental issue Be able to write factual texts about subjects linked to the environment

Be able to employ vocabulary essential for environmental content learning Be able to speak more fluently, and perform in public

Be able to present environmental issues, be part of a group presentation Create awareness and develop vocabulary concerning processes or techniques developed by foreign companies and to present their environmental impacts.

Learning outcomes:

Be able to read general and environmental texts and identify facts and evidence in order to interpret and analyze text.

Be able to analyze and interpret documents and videos about foreign companies and their environmental impacts and issues in order to discuss or present them. Be able to comprehend and communicate orally, using spoken English for personal and social purposes.

Be able to present information orally and participate in performances in English that demonstrate appropriate consideration of audience, purpose, and the information to be conveyed.

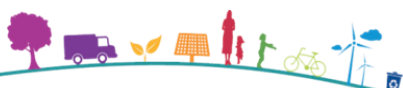
Course content:

Groups of 3 to 4 students will work together to study an environmental issue or topic of concern in a foreign country.

Each group is expected to produce a 10 to 12-minute oral report in English, accompanied by a 12 to 15-page written report in English which illustrates their subject.

Each report and presentation must present the general and historical facets of the topic, before developing its advantages, drawbacks, difficulties, opportunities, and other details.

Topic: An Engineering Case Study Report or a report about an innovative process developed by a foreign company, this presentation should describe a technical project that has been carried out. The report should provide information and make recommendations about actions to be taken to address the issues in the report.



Course code: 18_MSC_S01_CR502E_DUFOSSE_EI **Teacher:** DUFOSSE Karine

Semester: Semester 1

Module: Environmental Impact Assessment

Course title: Environmental Impact Assessment Methodology

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
3	1.5						

Course prerequisites:

None

Course objectives:

Other methods are used to evaluate the environmental impact of a product, sometimes the logic is less comprehensive (carbon footprint, focused on impact), or more general (ecological footprint). Two of these currently used methods are presented here.

- Ecological Footprint: the tool, its advantages, its limitations
 - Carbon Footprint: the tool, its advantages, its limitations
- Practical case: evaluate carbon footprint of a site with ADEME protocol

Learning outcomes:

By the end of this module, students will understand the following:

- Ecological Footprint: the tool, its advantages, its limitations
- Carbon Footprint: the tool, its advantages, its limitations

Course content:

Practical case: evaluate carbon footprint of a site with ADEME protocol



Course code: 18_MSC_S01_CR502E_DUFOSSE_LCA

Teacher: DUFOSSE Karine

Semester: Semester 1

Module: Environmental Impact Assessment

Course title: Life Cycle Assessment

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
3		10.5					

Course prerequisites:

None

Course objectives:

The main objectives of this module are:

- to be able to identify current and future environmental issues and impacts
- to be able to evaluate environmental impacts through the main impact assessment methods

Learning outcomes:

By the end of this module, students will understand the following:

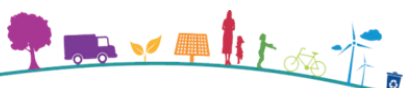
- Life Cycle Assessment methodology
- How to use Simapro software

Course content:

Life Cycle Assessment Methodology

Life Cycle Assessment steps

Simapro software



Course code: 18_MSC_S01_CR502E_LORANS **Teacher:** LORANS Anne

Semester: Semester 1

Module: Environmental Impact Assessment

Course title: Environmental Impact and Indicators

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
4.5	4.5						

Course prerequisites:

None

This knowledge is first addressed through scientific popularization which can be easily understood by all. Staying at the level of scientific popularization is justified since the concerned products are meant for a vast public who will need to understand the finer points of eco-design solution.

Course objectives:

To be able to identify current and future environmental issues and impacts as well as any other associated environmental concerns.

Learning outcomes:

Students should acquire the knowledge and skills to:

Identify and interpret the most frequently used environmental impacts

Identify some mechanisms: anthropogenic sources, relations of cause and effect leading to damage.

Course content:

Air pollution and climate change

Water pollution

Soil pollution

Loss of biodiversity, depletion of resources

Case studies: impacts of air pollution on different countries, study of IPCC reports for policymakers: approaches to climate change mitigation, trends in stocks and flows of greenhouse gases, ...



Course code: 18_MSC_S01_CR506E_CIK **Teacher:** PERRIN Loïc

Semester: Semester 1

Module: Energy Issues and International Sustainable Regulations

Course title: Best Available Technologies

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
3							

Course prerequisites:

The context of environmental regulation and/or regulatory Framework: directive, law, decree

Course objectives:

To know and to understand the implementation of the Best Available Techniques (BAT) concept and its evolution

To be able to understand and to analyze some tools which enable the BAT application at a local scale: BREF, 12 considerations, technical working report, etc.

To identify the main steps of a performance assessment methodology of techniques under BAT

Learning outcomes:

To be able to define and explain BAT concept in the perspective of IED or not

To be able to find and to "use" (not apply) the L-BAT methodology and to adapt its Framework to an Industry

To use BAT technical documents

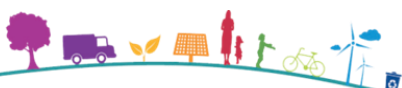
To be able to put concepts into perspective: causal link with sustainable development, eco-design approach, Life cycle assessment tool

Course content:

Part 1: review of the recent context of IED implementation In-class

Part 2: description of an environmental performance assessment methodology under BAT performance

Part 3: results / feedback / conclusion distance Learning course (1,5h) and in-class (1,5h)



Course code: 18_MSC_S01_CR506E_HULOT **Teacher:** HULOT Dany

Semester: Semester 1

Module: Energy Issues and International Sustainable Regulations

Course title: Energy Issues

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
6							

Course prerequisites:

None

Course objectives:

This module is intended to introduce basic and fundamental energy issues. This includes the consideration of national and transnational issues related to energy consumption and especially to fossil fuel depletion.

Learning outcomes:

Acquire knowledge and understand transnational energy issues and their influence on sustainability regulations
Explore different solutions to energy issues (energy saving, energy production, scenarios for the future, etc.)

Course content:

The first courses deal with energy main issues: production and consumption stakes, impact on economy, social, environment, security topics. Then will be detailed how the society consideration is taken into account by international and national policies, through the examples of Europe and France, and with the recent COP21 agreement.

In a second part, an offensive transition scenario, called "negawatt scenario", will be detailed to see what can be done in concrete ways.



Course code: 18_MSC_S01_CR506E_JUNG **Teacher:** JUNG Aude-Valérie

Semester: Semester 1

Module: Energy Issues and International Sustainable Regulations

Course title: Environmental Law Associated to Industries

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
4.5	3						

Course prerequisites:

None

Course objectives:

This module is intended to introduce basic knowledge/fundamentals of environmental law associated to industries in Europe and in France (Classified Installations + REACH regulations).

Learning outcomes:

The student is able to understand the main stakes and the evolution and modes of enforcement of classified and chemical regulations, and their implementation in France. The student acquires the capacity to understand legal issues and constraints for industries concerning the new classification system for chemicals and the classified installations.

Course content:

Officially classified installations of the protection of the environment: legislative context, definition, administrative procedures, permit file content (2h)

REACH regulation, dangerous chemicals, introduction for the case study (2,5h) Case studies for the classified installations in France (2*1,5h)

Case studies REACH (group for oral presentation) (3h)

Presentation of a compound or a family of compounds concerned by REACH/CLP regulations

Oral presentation, Items to discuss about:

Presentation of the compound(s), place in the industrial context (where is it used

? how? any statistics (annual production, ...)?

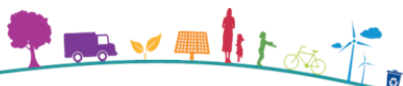
Health impacts (chronic/acute effects, target organs, CMR?)

Environmental impacts (Which media? Bioaccumulation? Transportation? Eco toxicological impacts on plants...)

Prevention means (environmental, work health protection, following indicators (TLV...), others ...)

Discussion on REACH legislation (France, difference with your country of origin): classification?

obligation for employers? economic, social and scientific impacts? substitution



Course code: 18_MSC_S01_CR506E_VIRLOUVET **Teacher:** VIRLOUVET Gaël

Semester: Semester 1

Module: Energy Issues and International Sustainable Regulations

Course title: Actors and regulations

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
4.5							

Course prerequisites:

None

Course objectives:

Environment: the role of civil society from local to international level

Learning outcomes:

The student is able to understand the main stakes energy issues and impacts of International Sustainability regulations

Course content:

Chinese Government

II. Situation

What is at stake: the four main environmental issues

Who makes decision?

Democratic organization in France

Democratic organization in the United States

Who influences decision?

What is the civil society?

Focus on environmental organizations (NGO's vs citizen associations)

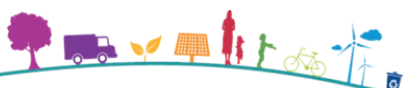
How to influence a decision in favor of the environment

III. Vista:

Success, failure and perspectives

France: "Grenelle de l'Environnement" and "Conférence Environnementale" UNFCCC

Tunisia: to rebuild a country after a revolution (the place for the environment)



Course code: S07A_TRAV_PERS **Teacher:** Research team

Semester: Fall semester

Module: Environmental Science Project **3 to 6 ects**

Course title: Environmental Science Project

Coefficient: 1

Course	TD	TP	Conf. ext.	TD ext.	TP ext.	Project work	Visit
tbd						tbd	

Course prerequisites:

Undergraduate work in Environmental Science or Environmental Engineering

Course objectives:

To complete a project in coordination with a UniLaSalle researcher, possible objectives include:

To evaluate the relevance of a scientific process/issue

To do a literature review of the state of the art of a scientific process/issue

To write a report on the subject

To present findings

Learning outcomes:

To understand thoroughly an environmental science issue

Course content:

To be determined, in coordination with the Head of Research at UniLaSalle Rennes

