



Solar Impulse went all around the world, 40 000km, with no fuel...



Cement which removes pollution. Photo-catalytic cement allows to recycle CO₂ emitted by vehicles in a Brussels tunnel.



This **tyre manufactured by Michelin**, whose alveolar structure is inspired from corals, cannot be flat since it contains no air. In addition, its tread, reformable by 3D printing, gives it a very long life. Tyres and weight reduce vehicle CO₂ emissions by 15 to 25%.

Environment nowadays



Recycling wastes from agriculture. The CIMV biorefinery transforms agricultural residues into pulp, wood glue and biofuels.



Cold combustion. Innoveox converts all hazardous industrial organic waste (phytopharmaceutical products, pyralenes, etc.) into water by Supercritical Hydrothermal Oxidation.

Positioning :

the engineer's tools to develop a sustainable economy



*Pollutions,
Scarcity of resources,
Nuisance ...*



2 objectives :

- ➔ Show :
Environmental Commitment
= **innovation driver**
= **source of profit for companies**
- ➔ Learn how to develop **sustainable solutions**, accounting for :
environmental problems, as well as societal, regulatory and **economic** issues



Focused on the **circular economy**, which opens up the **economy of functionality** and **industrial ecology** and **eco-design**.



The objectives and the issues associated with a sustainable development have been analyzed and classified in a formal way by the United Nations.

<https://sustainabledevelopment.un.org/>

Person in charge of the program :
Mesh 2 / Office 104

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<https://wiki.centrale-marseille.fr/S8Environnement/>



Environmental management



Circular economy

**The environment
professions**



**Monitoring of the
environmental
quality**



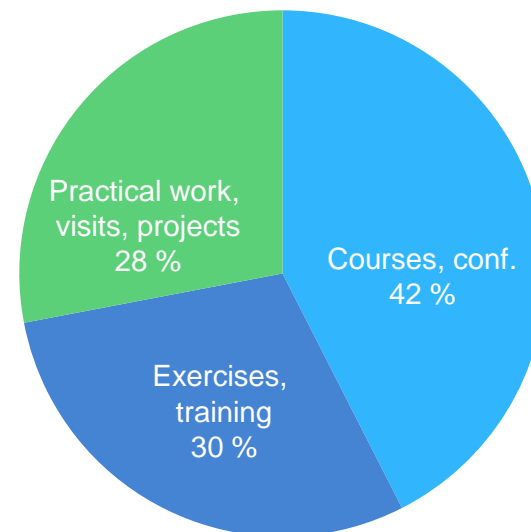
Treatment of effluents and pollutions



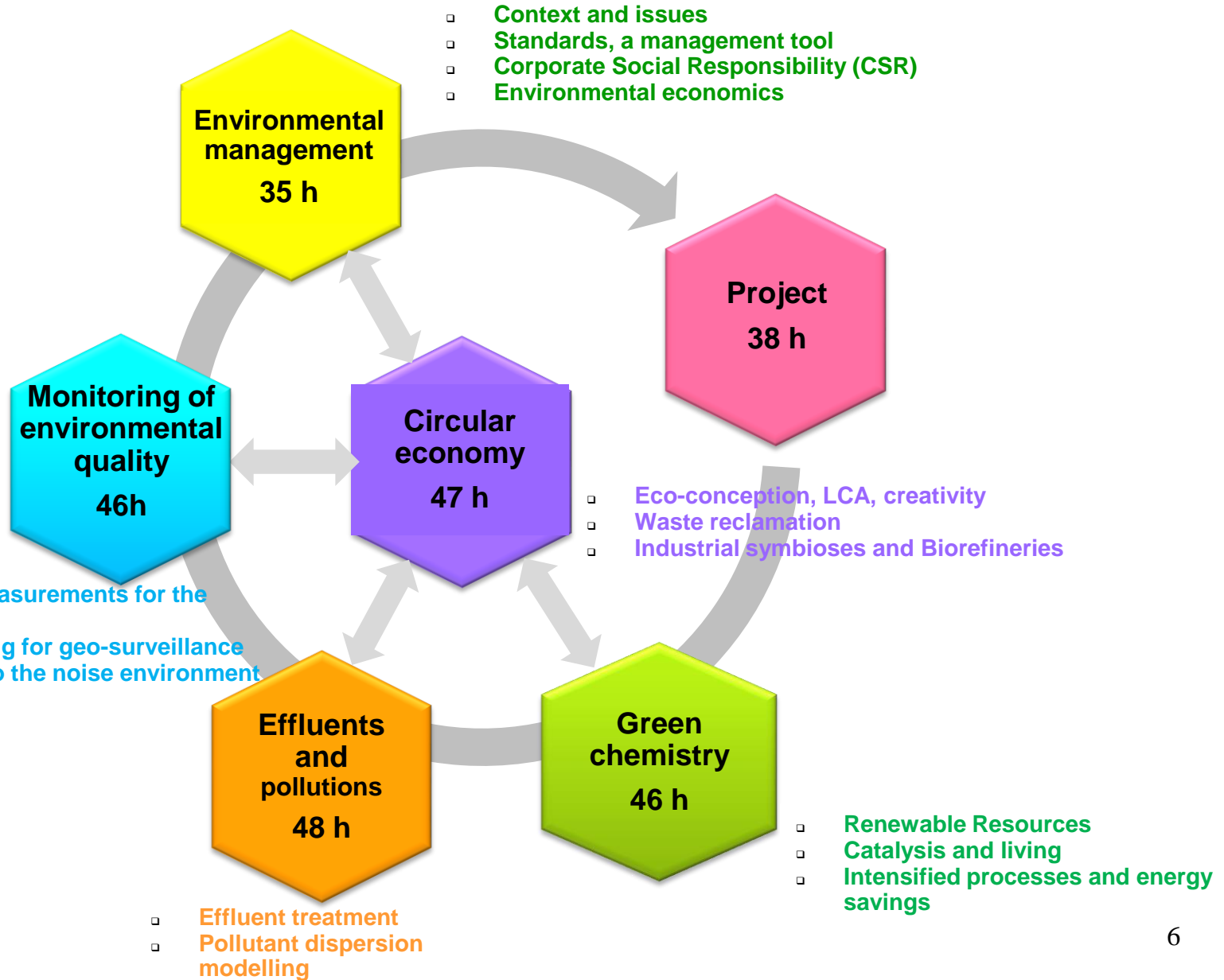
Green chemistry

S8 Environment at Centrale Marseille : layout

Teaching Units (TU)	Hours	ECTS	Hours		
			Courses, conferences	Exercises, training	Practical work, visits, projects
Languages - International Culture 4	40	3		40,0	
Environmental management	35	3	29	6	
Circular Economy	47	4	19	10	18
Effluents and pollutions	48	4	26	16	6
Green chemistry	46	4	27,5	10,5	8
Monitoring of the environmental quality	46	4	26	6	14
Project	38	2			38
Internship 2nd year (2A)	-	6		-	-
TOTAL	300	30	127,5	88,5	84



Program entirely taught in English



Green chemistry



- Coordinator : Damien Hérault
- Green chemistry concerns the industry of processes for material transformation. This teaching unit (TU) provides the essential bases associated with green chemistry and processes and helps to understand the possibilities of recycling and industrial symbiosis, which are presented in the TU "Circular economy".
- Contents :

Towards a biosourced economy ? (J.R. Llinas)	2
Introduction Green chemistry	2
Reach standards (M.-L. Martos)	2
Agroresources	10
Catalysis	6
Cells, live factories	6
Practical work	8
Intensification and energy savings	8
Biomimetism (H. Bachellier)	2
TOTAL	46 h

Effluents and pollutions

- Coordinator : Nelson Ibaseta
- The TU is concerned with effluent treatment and modelling of effluent diffusion into the environment. It has strong links with the TU "Monitoring" (detection and measurement of pollution) and the TU "Circular economy" (waste reclamation).
- Contents :

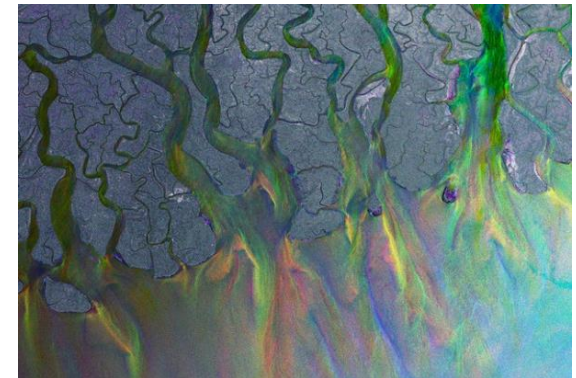
Treatment of effluents	
Water treatment	18
Membranes	10
Phytotechnologies : soils and water (I. Laffont-Schwob)	3
Diffusion into the environment	
Modelling pollutant dispersion in rivers	12
Radionuclid transfers in rivers (P. Boyer)	3
Visit (Sewage Treatment Plant, STP, Marseille)	2
TOTAL	48 h



Monitoring of the environmental quality

- Coordinator : Antoine Roueff
- The TU brings together tools for measuring the quality of water, air and noise environments. In connection with environmental management (standards, monitoring of the territory) and clean effluents (modelling of the diffusion and treatment of pollution).
- Contents :

Environmental acoustics	12
Acoustic monitoring of CO2 storage areas	2
Teledetection	14
Sensors	8
Sensors for chemistry	6
Air quality (Y. Chanac)	2
Visite of Atmosud air quality monitoring station	2
TOTAL	46 h



Environmental management

- Coordinator : Nicolas Clootens
- Environmental management is part of a sustainable development perspective. It integrates technical, regulatory, behavioural and economic components at company level and positions the role and missions of the engineer. Strongly linked to the TU "Circular economy".
- Contents :

Introduction Concepts, principles and history	2
Standards, a real management tool	10
Environmental economics	15
Conferences :	8
Questions about energy	
Eco-citizen energy cooperative	
Safety	
Agriculture and water resources management	
TOTAL	35 h



Circular economy



- Coordinator : Christian Jalain
- The TU relies on "Green chemistry" (technological tools) and "Environmental management" (managerial tools), it provides the tools for eco-design, the whole enabling waste to be transformed into new resources, and beyond that to build industrial ecology. This is really the current trend in the economy.
- Contents :

Introduction	2
LCA et Eco-Conception	
Eco-conception	10
Creativity tools (ASIT)	4
Life Cycle Assessment (SIMAPRO)	8
Project	6
Carbon footprint (ADEME Tool)	10
Industrial ecology	
Industrial ecology	2
Concrete examples of industrial ecology (V. Garbal)	3
Visit (Everé)	2
TOTAL	47 h

Project



- Coordinator : Fabien Anselmet
- Number of hours : 38 h
- Examples of recent subjects :
 - Mosquitoes: study of the toxicity of mosquito bollards (Techno-Beam)
 - Remediation of polluted soils (Novachim)
 - Study of the deposit of plastic and metal industrial packaging (Novachim)
 - Environmental optimization of Waste Edible Oil filtration (Oleo-déclic)
 - Recovery of atmospheric humidity by "fog catcher" nets (UTECH, Lima)
 - Storage and recycling of soil generated during major works (Geosafe)
 - Characterization of an electronic card without physical destruction (Compagnie de France)

Time table and information/documents

- Global time table + info/documents available on Moodle :

<https://moodle.centrale-marseille.fr/course/index.php?categoryid=27>

- Time table available (with room numbers) every week on Serenade :

<https://serenade.centrale-marseille.fr>



PARCOURS ENV

MAJ 28-01-2020 - V10

Semaine	n°	Lundi				Mardi				Mercredi				Jeudi				Vendredi			
		8h - 10h	10h15 - 12h15	13h30 - 15h30	15h45 - 17h45	8h - 10h	10h15 - 12h15	13h30 - 15h30	15h45 - 17h45	8h - 10h	10h15 - 12h15	14h00 - 16h00	16h15 - 18h15	8h - 10h	10h15 - 12h15	13h30 - 15h30	15h45 - 17h45	8h - 10h	10h15 - 12h15	13h30 - 15h30	15h45 - 17h45
03 février	6	Energie				Economie Industrielle				Journée partenariats				Sport				Sport			
10 février	7	LV1				Economie Industrielle				Economie Industrielle				Sport				Sport			
17 février	8	LV2				Economie Industrielle				Economie Industrielle				Sport				Sport			
24 février	9	Vacances hiver																			
02 mars	10	LV8				Economie Industrielle				Economie Industrielle				Visite sites ou labo 2A ou temps commun				Economie Industrielle			
09 mars	11	LV4				Economie Industrielle				Economie Industrielle				Sport				Sport			
16 mars	12	LV6				Economie Industrielle				Economie Industrielle				Sport				Sport			
23 mars	13	LV8				Economie Industrielle				Economie Industrielle				Sport				Sport			
30 mars	14	LV7				Economie Industrielle				Economie Industrielle				Sport				Sport			
06 avril	15	LV8				Economie Industrielle				Economie Industrielle				Sport				Sport			
13 avril	16	Vacances de Pâques																			
20 avril	17	LV8				Economie Industrielle				Economie Industrielle				Sport				Sport			
27 avril	18	LV10				Economie Industrielle				Economie Industrielle				Sport				Sport			
04 mai	19	LV+				Economie Industrielle				Economie Industrielle				Sport				Sport			
11 mai	20	S				Economie Industrielle				Economie Industrielle				Sport				Sport			
18 mai	21	S				Economie Industrielle				Economie Industrielle				Sport				Sport			
25 mai	22	S				Economie Industrielle				Economie Industrielle				Sport				Sport			

➤ **Any questions ?**

➤ **Two representatives are needed**
(to make the link with me and the other teachers, and for other small duties)