Environmental Quality Monitoring

ECTS credits
4 credits

In brief

Course langage: French

Presentation

Prerequisites

Common core courses

Learning objectives

The EU brings together tools for measuring the quality of water, the atmosphere and the sound environment. In connection with environmental management (standards, territorial monitoring) and effluents and clean pollution (treatment of effluents and pollution and modelling of the diffusion of pollution).
The objective is to provide the future engineer with methods and tools for geo-surveillance (in natural and urban environments) and pollution detection, whatever the scale of analysis. These tools will enable him/her to understand/develop the entire environmental monitoring chain, from data acquisition by dedicated sensors to information processing that takes into account the modeling of physical phenomena. The monitoring domains addressed range from chemical air pollution to noise prediction and reduction in urban areas and the state of continental surfaces (vegetation) by imagery.

Description of the programme

This course deals with tools for detecting pollution indicators, at local and global scales, with sensors and measurements for the environment and geo-monitoring. It also addresses issues related to environmental noise pollution, in order to achieve improvements in the noise environment (in connection with the notion of a sustainable silent city).

1. Sensors and measurements for the environment. (J. Bittebierre & D. Nuel)
Localized measurements with independent sensors or in networks allow a precise monitoring, in real time, on closed sites or on larger spaces. The focus is on the most commonly used sensors for precision localized measurements, and on components for

capturing measurements by imagery (optical sensors, including LIDAR (laser-based optical surveillance radar) and hyperspectral camera (camera that provides for each point of the captured image the composition of its spectrum), chemical sensors and gas sensors).

2. Remote sensing. (R. Marion & A. Roueff)
Remote sensing methods for geo-surveillance and pollution characterization. It is possible to extract relevant information on the state of vegetation, soils and seas from embedded sensors (multispectral, hyperspectral or radar). We will see how remote sensing works and how to implement algorithms for mapping through several application examples.

3. Acoustic pollution. (C. Maury & D. Mazzoni)
The focus will be on acoustic pollution in buildings and outdoors, with particular emphasis on the characterization of the acoustic field and sources, and on the treatment with acoustic screens. Also included is a lecture on acoustic technology for the prevention of CO2 storage risks.

Generic central skills and knowledge targeted in the discipline

- Scientific and technical innovation
be able to follow the development (especially in terms of data processing) of
data processing) of new or more efficient methods
- be able to supervise the implementation of a monitoring technique in a new
new context
- Mastery of complexity and systems:
- Know how to analyze a problem related to pollution
- Master the experimental methods for these types of situations in order to propose a monitoring method
to propose an adapted monitoring method, by implementing the most appropriate
techniques of detection and monitoring the most relevant
- Know how to interpret experimental results, and know how to identify problematic
problematic situations (breakdowns, abnormal background noise, various dysfunctions)

How knowledge is tested

CC1 (remote sensing part): an average of reports which contributes for 40% of the final grade.
CC2 (part " Sensors ") : presentation + bonus on TD which contributes for 30% of the final mark.
CC3 (part " Acoustics ") : project report which contributes for 30% of the final mark.

Bibliography

Georges Asch et col., Les capteurs en instrumentation industrielle, 5ème édition, Dunod, 1999
Frédéric P. Miller, Acoustique Environnementale, Alphascript Publishing, 2010
Nombreux articles dans la Revue des Techniques de l'Ingénieur

Teaching team

* Anselmet
* J. Bittebierre
* R. Marion
* C. Maury
* D. Mazzoni
* D. Nuel
* A. Roueff
* External speakers (CEA, LMA/CNRS, Atmo Sud)

Sustainable Development Goal

Climate action

Life below water

Life on land

Total des heures		**60h**
CM	Master class	36h
TD	Directed work	8h
TP	Practical work	16h

Useful info

Name responsible for EU

Lead Instructor

Antoine Roueff

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