Curriculum - Academic Year 2018-19
Characteristics of the Course Units

Name	*Air pollution*
ECTS credits	***3***
Year / Semester	*I /2°*
Specific learning outcomes	*On successful completion of this module students should be able to:* *1 – Introduce students to the problems of air pollution, especially to the aspects related to industrial activity.* *2- familiarize students with the tools to measure any type of pollution in order to predict its behaviour and its basic transport dispersion.* *3- introduce the principles and the environmental policy tools for air pollution, with emphasis on pollution prevention.* *4- introduce the basic knowledge that allows students to select the appropriate treatment technology depending on the type of pollution (gases, particles, metals, etc.), and also on the relevant environmental regulations.* *5- Train the students in the basic design calculations of particle and gas cleaning technologies*
Contents	1-*Introduction: The atmosphere layers- Main constituents Climate and Atmosphere.* *2-Atmospheric dispersion : Meteorological factors influencing the dispersion. Point and linear sources of pollution. Characteristics of a contaminant plume. Inversion. Overview of dispersion models and reaction of pollutants in the atmosphere* *3-Air pollution and legislation : Type of pollution -Air pollutants and their sources -Concepts of emission, transport and emission -Primary and secondary pollutants -Overview of environmental air policies -Emission levels, legislation -Air quality legislation* *4- Effects of air pollution : Global effects: ozone layer depletion, global warming potential -Local and regional effects: acid rain, photochemical smog, -Climate change. Global energy balance and radiative forcing. International agreements, commitments within the EU. -Prevention measures and international emissions trading system.* *5- Measuring air quality : Systems for measuring emissions -Sampling types -Selection of methods and instrumentation -Continuous measurement of the air quality (SO_2, CO, NOx, O_3 and so on) -Pollution monitoring network -Air Quality Index.* *6- Treatment and control systems for particles and dust : Treatment types Dry treatments (cyclones, settling chambers, etc..) Wet treatments (scrubbers, etc) Filtration treatments (fabric filters,* *7- Gas cleaning systems : Prevention systems: low emission burners, chemical reduction methods Absorption, adsorption, condensation, biofiltration. Thermal oxidation. Catalytic an non-catalytic combustion CO_2 capture and sequestration technologies*
Teaching and learning methods	*Face to face, 60 hours*
Teaching techniques	*Lectures, 35 hours* *Assessment activities, 25 hours*
Assessment methods	*Written and oral.* *A First exam and a Second exam are foreseen.* *Other deliveries (project) : presentations, and a final project document* *Practical activities will take place during class time*
Assessment criteria	*students will be able to: Classify the air pollutants by their sources of emission Identify the types of contaminants and distinguish the maximum permitted levels of emissions*

	and air quality- Identify the systems of control and / or measure emissions Recognize and apply the mechanisms used by the local and international authorities to monitor air quality- Identify standards and methodologies for emissions inventories - Develop a basic inventory from an industrial process, from a natural or urban system- Identify concepts, dispersion, transport and the effects of meteorological parameters on the dilution of pollutants Identify the different levels of complexity in modeling the dispersion of pollutants Apply mathematical representations (Gaussian model) to describe the process of dispersion of pollutants under different situations (Inversion, linear source pollution, etc. .) To interpret the results obtained from the point of view of air pollution reduction and also of air quality control- To classify technologies according to process parameters (flowrate, particle size distribution) - To calculate treatment system efficiencies from design parameters and working conditions. *Finally, students' ability to participate in class discussions with teachers and colleagues will be assessed in practical classes.*
Assessment metrics	*Attribution of a final grade*
Criteria of attribution of the final grade	*The grade goes from 1 (minimum) up to 10 (maximum). The minimum threshold to pass is 6. To pass the exam students should obtain the minimum evaluation in all the assessments.* *The final grade will be determined according to the following rules:* - *Mid-term written test: 30%* - *Final term written test: 70%*
Preparatory course units	*N.A.*
Didactic material	*Schnelle, Karl B.; Brown, Charles A. Air pollution control technology handbook. Boca Raton: CRC Press, 2002. ISBN 9780849395888* *Mycock, John C.; McKenna, John D.; Theodore, L. Handbook of air pollution control engineering and technology. Boca Raton: CRC Press, 1995. ISBN 1566701066.*