Centre	**University College of Engineering of Vitoria-Gasteiz**
Name of subject	**26099 – Treatment of Air Pollution**
Qualification	**Degree in Industrial Chemical Engineering**
Type	**Elective**
Credits	**6 ECTS**
Year	**4**
Term(s)	**2nd**
Department	**Chemical and Environmental Engineering**
Language	**Spanish**

Outcomes / Objectives

Analyse the fundamentals of air pollution: its origin, causes and effects.
Identify the different types of pollutants emitted into the atmosphere in order to be able to analyse their effects.
Study the phenomena that take place in the atmosphere: physicochemical transformations, transport, dispersion and deposition of pollutants, and noise transmission.
Use the appropriate methodology and have knowledge of the operation of chemical and noise pollutant measuring equipment.
Analyse the methods and operation of chemical and noise pollutant purification and control equipment in atmospheric emissions.
Propose or design appropriate systems to measure and/or reduce the effects caused by the various air pollutants.
Use bibliography and other technological tools to obtain and manage the requested information.
Write accurate, well-reasoned reports (ability to analyse and synthesise).
Orally transmit technical information clearly and orderly.
Participate and collaborate in different teams to carry out simple assignments or projects.
Manage time efficiently.

Syllabus

Unit 1. THE AIR POLLUTION PROCESS

Emission of pollutants into the atmosphere: sources and sinks. Major chemical pollutants in urban atmospheres. Physicochemical transformations. Transport and dispersion of pollutants. Deposition processes. Effects caused by pollution. Greenhouse effect. Acid rain. Photochemical smog. Ozone layer depletion.

Unit 2. TREATMENT OF GASEOUS EFFLUENTS

Methods for purifying and controlling particles from air flows: sedimentation chambers, cyclones, wet scrubbers, filters, electrostatic precipitators. Areas of application and design parameters.
Polluted gas and vapour purification methods: adsorption, absorption, combustion. Application, performance and adaptation of techniques according to the type of pollutant. Purification equipment and industrial facilities.

Unit 3. NOISE POLLUTION

Acoustic fundamentals. Airborne sound transmission process. Noise sources and effects. The problem of noise in industry: acoustic impact. Noise measurement and control. Acoustic absorption. Environmental acoustics and architectural acoustics. Acoustic behaviour of different materials. The problem of noise in industry.

Unit 4. AIR POLLUTANT PURIFICATION STRATEGIES

Current legislation. Air pollution prevention techniques. Examples of solutions proposed for the purification of gaseous effluents in chemical industries. Case study analysis: general procedure and practical applications to real cases.

Methodology

Teaching Method

Face-to-Face Teaching Hours								
Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
30		15	15					
Student Hours of Non Face-To-Face Activities								
Lectures	Seminars	Classroom practice	Lab. practice	Computer sessions	Clinical practice	Workshops	Industrial workshops	Field practice
30	45	15						

Assessment System

General criteria

→ Practical tasks (exercises, case studies or problems)
→ Individual assignments
→ Group assignments
→ Presentation of assignments, reading...

Clarification regarding assessment

The subject is assessed by continuous assessment through the following tasks:

→ Exercises, case studies or problems: 40%
→ Individual assignments: 20%
→ Group assignments: 20%
→ Presentation of assignments: 20%

Compulsory materials

- Bibliography for consultation
- Internet for obtaining air quality data
- Catalogues of air pollution measuring and control equipment
- Measuring equipment operation manuals

Bibliography

Basic Bibliography

- FICYT: Bueno, J. L. H. Sastre y A.G. Lavín (1997). Contaminación e Ingeniería Ambiental. Ed. Universidad de Oviedo.
- Kiely G. (1999). Ingeniería Ambiental. Ed. McGraw-Hill
- Orozco C et al. (2002). Contaminación Ambiental. Una visión desde la química. Ed. Thomson
- Sanz Sa J.M. (1987). El ruido. Publicaciones del M.O.P.U.: Ministerio de Obras Públicas y Urbanismo.

In-depth Bibliography

- Nevers (1997). Ingeniería de control de la Contaminación del aire. Ed. McGraw-Hill
- Wark K. y C.F. Warner (1999). Contaminación del aire: origen y control. Ed. Limusa
- Seinfeld J.H. (1988). Fundamentals of Air Pollution Engineering. Ed. Prentice Hall
- Cyril M. Harris (1998). Manual de medidas acústicas y control del ruido. Ed. McGraw-Hill.

Magazines

- Atmospheric Environment
- Environmental Engineering Science.

Websites

- http://www.epa.gov/espanol/
- http://www.ingurumena.ejgv.euskadi.net/r49-3614/es/contenidos/informacion/red_calida_aire_capv/es_975/red_vigilancia_c.html
- http://www.vitoria-gasteiz.org/we001/was/we001Action.do?aplicacion=wb021&tabla=contenido&idioma=es&uid=7f3981df_11aa05f89e4__7ffe