VNIVERSITAT DE VALÈNCIA

Course Guide
36485 Air pollution control and waste management

COURSE DATA

Data Subject	
Code	36485
Name	Air pollution control and waste management
Cycle	Grade
ECTS Credits	6.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
1401 - Degree in Chemical Engineering	School of Engineering	4	Second term

Subject-matter

Degree	Subject-matter	Character
1401 - Degree in Chemical Engineering	23 - Optional subjects	Optional

Coordination

Name	Department
IZQUIERDO SANCHIS, MARTA	245 - Chemical Engineering
MARZAL DOMENECH, PAULA	245 - Chemical Engineering

SUMMARY

The course Air Pollution Control and Waste Management is an optional course taught in the Chemical Engineering Degree.

This course consists of 6 ECTS distributed among theoretical and practical classes. In this course, the students will gain the necessary knowledge to design and operate the air pollution control equipment in order to apply them at industrial scale, as well as the engineering aspects related to the waste management and treatment, especially focused on the industrial wastes and on the technologies for treatment and disposal of several industrial sectors.

Observations: The theory classes will be taught in Spanish and the practical classes as stated in the course sheet available on the website of the degree.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is suggested to pass previously the next courses in order to affront with guaranties the matter: Environment and sustainability and Environmental pollution engineering.

OUTCOMES

1401 - Degree in Chemical Engineering

- O1 - More comprehensive skills than those acquired in compulsory subjects.

LEARNING OUTCOMES

Select the most appropriate technique among the different treatment systems in a specific problem of emissions of pollutants to air and waste generation (Skill O1)

-Design, run and operate the different technologies for treatment of air emissions (Skill O1).

-Use the Gaussian dispersion model of air pollution and its application in the stack design (Skill O1).

-Interpret legislation about wastes, incineration, landfills and contaminated soils (Skill O1).

-Know the main sources of production of industrial hazardous waste (Skill O1).

-Select the cleaner production measures aimed at minimizing waste in companies from various industrial sectors (Skill O1).

-Evaluate critically the obtained results from the practical exercises (Skill O1).

In addition to the outcomes mentioned above, during the course will encourage the development of several social and technical skills as the followings:

-Capacity for critical analysis and synthesis.

-Appropriate use of scientific and technical terms.

-Ability in oral and writing communication.

-Interpersonal relationship skills.

-Ability to learn independently.

-Creativity. Ability to explore new situations.

DESCRIPTION OF CONTENTS

1. Air pollution control

Unit 1. Air pollution dispersion and stack design.
Gaussian model of pollutant dispersion. Stack design.
Unit 2. Treatments for air polluted with particles.
Particle sizing distribution. Terminal settling velocity. Collection equipment design and operation. Guideline to select equipment. Unit 3. Treatments for air polluted with organic and inorganic compounds. Treatment equipment design and operation. Guideline to select equipment.

2. Waste management

Unit 4. Hazardous waste characterization.
Hazardous waste: sources and production. Hazardous waste legislation. Identification of hazardous waste.
Unit 5. Waste prevention.
Circular Economy. Diagnostic of minimization opportunities. Examples of clean production.
Unit 6. Technologies for valorization and removal of wastes.
Treatment methods with potential of recovery. Physico-chemical treatments. Biological treatments. Thermal treatments. Solidification and stabilization of wastes. Hazardous waste landfills.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Classroom practices	30,00	100
Development of group work	10,00	0
Study and independent work	30,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	10,00	0
Preparation of practical classes and problem	15,00	0
Resolution of case studies	10,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The methodology used in the course will consider the following aspects:

Lecture sessions: the professor will offer a global vision of the course and will focus on the fundamentals and more difficult aspects, besides the resources that will be used throughout the sessions. Some practical applications will be formulated in order to enhance the assimilation of the introduced concepts. These sessions will be taught in a single group.

Practical lessons: some examples and practical applications will be exposed and students will resolve problems and perform group work and/or oral presentations in order to enhance the assimilation of the concepts introduced. The skills of students in decision-making will be enhanced. There will be practical activities in which the group work under the supervision of the teacher in the resolution proposed activities for groups. (Skill O1).

EVALUATION

The assessment of student learning is carried out as follows. Students have two opportunities to pass the course.

First Examination (May-June)

Through the assessment of the continuous assessment activities carried out throughout the semester and the mark of the exam that will take place on the official date. The overall evaluation of the subject will be quantified by a weighted average of two parts, with a relative weight of 30% of the continuous assessment activities and 70% of the exam.

A set of individual and/or group activities during the semester is proposed with an established deadline:

Virtual questionnaires: 10% of the final grade.

Individual and/or group activities: 20% of the final grade.

If the attendance to the classes is less than 70%, the activities of continuous evaluation will be qualified as Not presented. To pass the subject, the exam mark must be equal to or greater than 4.5 and the mark in each of the two parts of the exam (theoretical part and practical part) must be equal to or greater than 4.0. The subject will be considered passed when the weighted average grade is equal to or greater than 5.0. If the minimum required in the exam is not exceeded, the grade of the course will be the lowest grade.

Second Examination (June-July)

By assessing the non-recoverable activities delivered on the date established throughout the semester and the exam mark to be made on the official date. Non-recoverable activities will be specified at the beginning of the course. The overall evaluation of the subject will be quantified by a weighted average of two parts, with a relative weight of 15% of the non-recoverable activities and 85% of the exam.

To pass the course, the exam note must be equal to or greater than 4.5 and the mark in each of the two parts of the exam (theoretical part and practical part) must be equal to or greater than 4.0. The subject will be considered passed when the weighted average grade is equal to or greater than 5.0. If the minimum required in the exam is not exceeded, the grade of the subject will be the lowest grade.

In any case, the evaluation system will be governed by the provisions of the Reglament de Avaluació i Qualificació de la Universitat de València per a títols de Grau i Màster (http://links.uv.es/7S40pjF).

REFERENCES

Basic

- Theodore, L. Air pollution control equipment calculations. John Wiley & Sons (2007). (e-book en UV)
- Cooper, C.D., Alley, F.C. Air pollution control: a design approach. Waveland Press (2012).
- de Nevers, N. Ingeniería de Control de la Contaminación del Aire. McGraw-Hill Interamericana (1998).
- Christensen, T. Solid Waste Technology and Management. John Wiley & Sons Ed (2010). (e-book en UV)
- Woodard and Curran. Industrial Waste Treatment Handbook. Butterworth-Heinemann Ed., Elsevier (2005), Burlington (USA). (e-book en UV)
- Freeman, H.M. "Standard Handbook of Hazardous Waste Treatment and Disposal". McGraw-Hill, Inc., New York (1998).

Additional

- Wark, K., Warner, C.F., Davis, W.T. Air Pollution: its Origin and Control. Addison-Wesley (1997).
- McKenna, J.D., Turner, J.H., McKenna Jr, J.P. Fine particle (2.5 microns) emissions: regulations, measurement and control. John Wiley & Sons (2008). (e-book en UV)
- Vallero, D.A. Fundamentals of air pollution. Elsevier (2008). (e-book en UV)
- Weiner, R.F., Peirce, J.J., Vesilind, P.A. Environmental Pollution and Control. Butterworth-Heinemann (1997). (e-book en UV)
- Lagrega, M.D., Buckingham, P.L. y Evans, J.C. "Gestión de Residuos Tóxicos. Tratamiento, eliminación y recuperación de suelos. McGraw-Hill, Inc., Madrid (1996).
- Rodríguez, J.J. y Irabien, A. "La Gestión sostenible de los residuos peligrosos". Editorial Síntesis, Madrid (2013).
- Levin, M. y Gealt, M.A. "Biotratamiento de Residuos Tóxicos y Peligrosos". McGraw-Hill, Inc., Madrid (1997).

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

Contents

The contents initially established in the Course Guide are maintained.

Workload and planning of teaching

Workload:

The activities described in the Course Guide with their time dedication are maintained.

Planning of teaching:

The material for the follow-up of the classes allows to continue with the teaching time planning both in days and in time, whether the teaching is face-to-face in the classroom or not.

Teaching methodology

If it is required by the sanitary situation, the Academic Committee of the Degree will approve the Teaching Model of the Degree and its adaption to each subject, establishing the specific conditions in which it will be developed, taking into account the actual enrolment data and the space availability.

Evaluation

The evaluation system described in the Course Guide in which the activities have been specified as well as their contribution to the final grade of the subject is maintained.

If there is a closure of the facilities for sanitary reasons that affect the development of any face-to-face evaluable activity, it will be replaced by a test/activity of a similar nature that will be carried out in virtual mode using the computer tools licensed by the University of Valencia. The contribution of each evaluable activity to the final grade of the course will remain unchanged, as established in this guide.

References

The recommended references in the Course Guide are maintained, since they are available. In addition, it will be complemented with notes, slides and problems uploaded to the Virtual Classroom.