

Course guide

330253 - TA1 - Environments Technology I

Last modified: 31/05/2024

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

Degree: BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Optional subject).
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2016). (Optional subject).

Academic year: 2024 **ECTS Credits:** 6.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: ANNA BONSFILLS PEDROS

Others: M. MONTSERRAT SOLE SARDANS

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. Understand and use the basic principles of environmental water and air technologies and their application.

Transversal:

2. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 3. Communicating clearly and efficiently in oral and written presentations. Adapting to audiences and communication aims by using suitable strategies and means.
3. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.
4. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

TEACHING METHODOLOGY

Explanatory classes, in large group, in which the concepts related to most of the specific objectives of the environmental technologies of air and water will be discussed. The active participation of the student body will be encouraged in the classroom in various ways: inviting students to highlight the most relevant points discussed in class. In small group classes, some time will be spent correcting, commenting on, or solving problems in class. Solve any doubts that have arisen. For each of the 2 contents, problems or exercises related to the specific objectives of the content will be proposed, which will be part of the continuous evaluation (evaluable problems / exercises).

The practices will be carried out in the chemistry laboratory. The student must have read the practice script that will be available to them at ATENEA. Once the experimental results have been obtained in the laboratory, the student must prepare a report according to the guidelines indicated by the teacher.

The visit to the WWTP will require the student to previously consult the documentation available at ATENEA about the plant, and to complete a post-visit questionnaire.

LEARNING OBJECTIVES OF THE SUBJECT

After taking the Environmental Technologies I Subject, the student must be able to:

- Interpret the main air and water quality indicators and air and water pollution regulations.
- Identify and distinguish the characteristic operations and processes of air treatment and wastewater treatment.
- Apply the fundamentals of mass and energy balances in polluted air treatment operations.
- Apply the fundamentals of balances of matter, equilibrium and kinetics to the basic design of operations and characteristic processes of water treatment.
- Select the most appropriate treatment for specific cases.

STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Hours small group	15,0	10.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Content 1: Environmental Technologies: Air

Description:

1. INTRODUCTION TO ATMOSPHERIC POLLUTION

2. AIR POLLUTION TREATMENT TECHNOLOGIES

2.1. - Elimination of particles.

2.2. - Elimination of gases.

3. ANALYSIS AND CONTROL OF AIR POLLUTION

Related activities:

- Lectures with active participation of students (large group).
- Problem solving and exercises in the classroom (Large and small group).
- Laboratory practice 1 (small group) (it is part of the evaluable activity 1).
- Problems and / or exercises of continuous evaluation (it is part of the evaluable activity 3).
- Individual content test 1 (part of assessable activity 4).

Full-or-part-time: 75h

Theory classes: 23h

Laboratory classes: 7h

Self study : 45h

Content 2: Environmental technologies: water

Description:

4. CHARACTERIZATION OF WATERS

- 4.1. Water characterization parameters. Legislation.
- 4.2. Type of treatment.

5. - Physicochemical treatments.

- 5.1. Chemical Processes: pH modification, Coagulation / flocculation, Precipitation, Oxidation / reduction.
- 5.2. Physical operations: roughing, sedimentation, flotation, filtration and operations applied to tertiary treatment.

6. BIOLOGICAL TREATMENTS

- 6.1. Activated sludge treatment.
- 6.2. Fixed biomass treatments.
- 6.3. Low cost treatments.
- 6.4. Biological removal of nutrients.

7. - SLUDGE TREATMENT

- 7.1. Objective and stages of sludge treatment.
- 7.2. Anaerobic digestion of sludge.

Related activities:

- Lectures with active participation of students (large group).
- Problem solving and exercises in the classroom (Large and small group).
- Laboratory practice 2 (small group) (it is part of the evaluable activity 1).
- Urban WWTP visit (assessable activity 2).
- Problems and / or exercises (part of assessable activity 3).
- Individual content test 2 (part of assessable activity 4).

Full-or-part-time: 75h

Theory classes: 22h

Laboratory classes: 8h

Self study : 45h

ACTIVITIES

TITLE OF ACTIVITY 1: LABORATORY PRACTICES

Description:

Practice 1. Work with immission analysis and control equipment: Dräger and SF8 equipment for determination of particles and gases.

Practice 2. Determination of water quality parameters. Solids, COD, BOD, etc.

Full-or-part-time: 12h

Self study: 8h

Laboratory classes: 4h



TITLE OF ACTIVITY 2: WWTP VISIT

Description:

Visit urban wastewater treatment plant.

Material:

Treatment plant scheme available on the ATENEA digital campus.

Full-or-part-time: 5h

Self study: 2h

Laboratory classes: 3h

TITLE OF ACTIVITY 3: RESOLUTION OF PROBLEMS AND / OR EXERCISES. CONTINUOUS ASSESSMENT

Description:

Resolution of problems and / or exercises by the student body, proposed by the teacher.

Correction by the teacher who will return it evaluating the results and conclusions with the students.

In addition, on occasion the co-evaluation among the students can be raised.

Material:

Statements of the problems and / or exercises available on the ATENEA digital campus.

Power-Point Presentations.

Recommended bibliography.

Exercises solved in the classes (large and small group).

Delivery:

Delivery of the solution of the problems and / or exercises proposed in writing.

Full-or-part-time: 32h

Self study: 30h

Theory classes: 2h

TITLE OF ACTIVITY 4: INDIVIDUAL EVALUATION TESTS

Description:

Two individual tests in the classroom with a part of theoretical concepts and resolution of problems and / or questions related to the contents of the subject.

- Test 1. contents 1.

- Test 2. content 2.

Material:

Statements and calculator to carry out the tests.

Delivery:

Resolution of the evidence and presentation in writing.

Full-or-part-time: 54h

Self study: 50h

Theory classes: 4h

GRADING SYSTEM

The final grade is obtained by applying the following percentages:

Laboratory practices and visit questionnaires (Activities 1 and 2) 15%. Exercises and / or problems continuous evaluation (Activity 3) 15%.

Individual Tests (test content 1 + test content 2) (Activity 4) 70%.

Re-evaluation:

- Students who have obtained a 'failed' grade in the regular evaluation period can access the re-evaluation process.
- Those students who have a 'no-show' or have passed the course in the regular evaluation period cannot access the re-evaluation process.
- The result of the re-evaluation is a grade that replaces the grade obtained in the individual tests, in the ordinary evaluation process, which is higher than this and, in any case, it will be at most a 'pass' 5. The final grade is obtained by applying the following percentages:

Laboratory practices and visit questionnaires (Activities 1 and 2) 15%. Exercises and / or problems continuous evaluation (Activity 3) 15%.

Individual Tests (test content 1 + test content 2) (Activity 4) 70%.

Re-evaluation:

- Students who have obtained a 'failed' grade in the regular evaluation period can access the re-evaluation process.
- Those students who have a 'no-show' or have passed the course in the regular evaluation period cannot access the re-evaluation process.
- The result of the re-evaluation is a grade that replaces the grade obtained in the individual tests, in the ordinary evaluation process, which is higher than this and, in any case, it will be at most a 'pass' 5.

EXAMINATION RULES.

- Compulsory attendance at small group sessions (Laboratory practices and visits).
- Deliver, according to the conditions required by the teacher, the problems and / or continuous assessment exercises.
- Solve and deliver the two individual tests.

BIBLIOGRAPHY

Basic:

- Benítez, J. Process engineering and design for air pollution control. Englewood Cliffs: Prentice Hall, 1993. ISBN 0137232144.
- Bueno, J. L.; Sastre, H. L.; Lavin A. G. Contaminación e ingeniería ambiental. Vol. 2, Contaminación atmosférica. Oviedo: F.I.C.Y.T., 1997. ISBN 8492313137.
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Complementary:

- American Public Health Association; American Water Works Association; Water Pollution Control Federation. Métodos normalizados para el análisis de aguas potables y residuales. Madrid: Diaz de Santos, 1992. ISBN 8479780312.
- Capó Martí, M. A. Principios de ecotoxicología: diagnóstico, tratamiento y gestión del medio ambiente. Madrid: McGraw-Hill Interamericana, 2002. ISBN 8448136721.
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RESOURCES

Other resources:

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- Bonsfills, A. Technologies Ambientals I: recull de problemes. Manresa: EPSEM, 2021.