Management of Water and Waste Treatment Plants (250MEA006)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA)
Credits	5.0 ECTS
Programs	MÀSTER UNIVERSITARI EN ENGINYERIA AMBIENTAL (pla 2024) MÀSTER UNIVERSITARI EN ENGINYERIA DE L'AIGUA (pla 2025)
Course	2025/26

Main teaching language at each group

- Group 10Q2 Spanish (Q2)

Faculty

Responsible Faculty: Joan Garcia Serrano
Faculty: María Dolores Álvarez Del Castillo, Joan Garcia Serrano, Roberto Ribes Minguez

Objectives of Education

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Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	35.0 h	77.78 %
	Medium group	0.0 h	0.00 %
	Laboratory classes	10.0 h	22.22 %
	Guided Activities	0.0 h	0.00 %
Self Study		80.0 h	

Contents

MANAGEMENT OF WATER AND SOLID WASTE PLANTS

The subject "Management of Water and Waste Treatment Plants" covers the principles and techniques necessary for the operation, maintenance, and efficient management of drinking water treatment plants, water regeneration, and wastewater treatment, as well as the management of urban solid waste. It focuses on the selection and use of equipment, automation and process control, energy efficiency, and economic and safety aspects.

Specific Objectives

1. Introduction to Treatment Plant Management
1.1. Importance of treatment plant management.
1.2. Types of water and waste treatment plants.
2. Drinking Water Treatment Plants

2.1. Regulatory framework. Drinking water quality.
2.2. Potabilization processes and treatment technologies.
2.3. Equipment selection: criteria. Control, monitoring, and supervision systems.
2.4. Operation, maintenance, and conservation: planning and tools.
2.5. Organization, profiles, staff, and roles.
2.6. Structure of operation and maintenance costs. Strategies for improving efficiency and energy consumption.
2.7. Safety and health.
3. Regeneration and Treatment of Wastewater
3.1. Regulatory framework. Quality of treated waters.
3.2. Wastewater treatment processes and technologies. Water regeneration processes. Treatment, valorization, and disposal of sludge.
3.3. Equipment selection: criteria. Control, monitoring, and supervision systems: microbiological control of processes.
3.4. Operation, maintenance, and conservation: planning, tools, problem identification: sanitation, water and sludge line.
3.5. Organization, profiles, staff, and roles.
3.6. Structure of operation and maintenance costs. Strategies for improving efficiency and energy consumption.
3.7. Safety and health.
4. Waste Treatment Plants
4.1. Industrial waste. Generation, characterization, and typology. Regulatory framework related to waste management.
4.2. Management of municipal waste. Generation, composition, collection operations. Mechanical biological treatment plants (MBT). Inputs, operations, equipment, and outputs.
4.3. Thermal treatment systems for waste. Energy efficiency, incineration residues, gaseous emissions, and gas treatment.
4.4. Waste disposal. Types of controlled landfills. Admission criteria. Leachate treatment.
5. Automation and Control
5.1. Automation systems in treatment plants.
5.2. Process control and monitoring.
5.3. Technological innovations: Big Data, AI, and Machine Learning.
6. Contracts and Administrative Management
6.1. Forms of management and operation: direct, indirect, concert, etc.
6.2. Legal and administrative aspects: companies and employees.

MANAGEMENT OF DRINKING WATER TREATMENT PLANTS. THEORY AND PROBLEMS

2. Drinking Water Treatment Plants
2.1. Regulatory framework. Drinking water quality.
2.2. Potabilization processes and treatment technologies.
2.3. Equipment selection: criteria. Control, monitoring, and supervision systems.
2.4. Operation, maintenance, and conservation: planning and tools.
2.5. Organization, profiles, staff, and roles.
2.6. Structure of operation and maintenance costs. Strategies for improving efficiency and energy consumption.
2.7. Safety and health.

Specific Objectives

Apply knowledge of the Unit 2

MANAGEMENT OF WASTEWATER TREATMENT PLANTS. THEORY AND PROBLEMS

Regeneration and Treatment of Wastewater
3.1. Regulatory framework. Quality of treated waters.
3.2. Wastewater treatment processes and technologies. Water regeneration processes. Treatment, valorization, and disposal of sludge.
3.3. Equipment selection: criteria. Control, monitoring, and supervision systems: microbiological control of processes.
3.4. Operation, maintenance, and conservation: planning, tools, problem identification: sanitation, water and

sludge line.
3.5. Organization, profiles, staff, and roles.
3.6. Structure of operation and maintenance costs. Strategies for improving efficiency and energy consumption.
3.7. Safety and health.

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Apply knowledge of the Unit 3

Specific Objectives

Regeneration and Treatment of Wastewater
3.1. Regulatory framework. Quality of treated waters.
3.2. Wastewater treatment processes and technologies. Water regeneration processes. Treatment, valorization, and disposal of sludge.
3.3. Equipment selection: criteria. Control, monitoring, and supervision systems: microbiological control of processes.
3.4. Operation, maintenance, and conservation: planning, tools, problem identification: sanitation, water and sludge line.
3.5. Organization, profiles, staff, and roles.
3.6. Structure of operation and maintenance costs. Strategies for improving efficiency and energy consumption.
3.7. Safety and health.

MANAGEMENT OF SOLID WASTE TREATMENT PLANTS. THEORY AND PROBLEMS

4. Waste Treatment Plants
4.1. Industrial waste. Generation, characterization, and typology. Regulatory framework related to waste management.
4.2. Management of municipal waste. Generation, composition, collection operations. Mechanical biological treatment plants (MBT). Inputs, operations, equipment, and outputs.
4.3. Thermal treatment systems for waste. Energy efficiency, incineration residues, gaseous emissions, and gas treatment.
4.4. Waste disposal. Types of controlled landfills. Admission criteria. Leachate treatment.

Specific Objectives

Apply the concepts of Unit 4

Evaluation

Activities

Visits waste management facilities

Visits various waste management facilities

Dedication

3h

Visit water treatment plants

Visit water treatment plants to witness the application of procedures and technologies explained in the classroom.

Dedication

3h

Single and group assignments

Students will prepare both individually and in teams in order to carry out tasks and assignments that will be presented.

Dedication

10h

Teaching Methodology

The course consists of 2.3 hours a week in classes in the classroom and 0.7 hours a week to visit facilities. Engage in lectures 2.3 hours when the teacher explains the concepts and basic raw materials, presents examples and exercises are performed in order to consolidate the general and specific learning objectives. Used material support in the form of detailed syllabus through virtual campus ATENEA: content, programming and evaluation activities directed learning and literature.

Grading Rules

(*) The evaluation calendar and grading rules will be approved before the start of the course.

The mark of the course is obtained from the ratings of continuous assessment.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

Test Rules

Failure to perform a continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

Office Hours

Monday 10-11h

Bibliography

Basic

- Metcalf & Eddy, AECOM. Wastewater engineering: treatment and resource recovery. 5th ed. New York, N.Y.: McGraw-Hill Education, 2014. ISBN 9780077441210.
- Droste, R.L. Theory and practice of water and wastewater treatment. 2nd ed. Hoboken, NJ: John Wiley & Sons, 2019. ISBN 9781119312376.
- Díaz Fernández, J.M. Ecuaciones y cálculos para el tratamiento de aguas. Madrid: Paraninfo, 2018. ISBN 9788428341523.
- Spellman, F.R. Handbook of water and wastewater treatment plant operations. Fourth edition. Boca Raton: CRC Press, 2020. ISBN 9780367485559.
- Crittenden, J.C.; Rhodes, R.; Hand, D.W.; Howe, K.J.; Tchobanoglous, G. Stantec's water treatment: principles and design. 3rd ed. Hoboken, NJ: John Wiley & Sons, Inc., 2022. ISBN 9781119820086.