VNIVERSITAT DE VALÈNCIA

Course Guide
43817 Simulation and advanced design of wastewater treatment plants

COURSE DATA

Data Subject	
Code	43817
Name	Simulation and advanced design of wastewater treatment plants
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
2227 - M.U. en Ingeniería Ambiental	School of Engineering	2	First term

Subject-matter

Degree	Subject-matter	Character
2227 - M.U. en Ingeniería Ambiental	5 - Optatividad para Especialización	Optional

Coordination

Name	Department
SECO TORRECILLAS, AURORA	245 - Chemical Engineering

SUMMARY

Professors UPV: Enrique Asensi Dasí

The Simulation and Advanced design of wastewater treatment plants course is an optional subject of the intensification block related to the management of wastewater treatment plants. In this subject students will deepen into the application of mathematical models to the design and simulation of wastewater treatment plants and will become familiar with the DESASS computer tool (DEsign and Simulation of Activated Sludge Systems.) This course is based on concepts acquired in the Water treatment and Advanced modelling of water treatment courses that are taught during the first year 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

Some knowledge of the following subjects is recommended:
Water treatment
Advanced modelling of water treatment

OUTCOMES

2172 - M.U. en Ingeniería Ambiental

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Identify and apply technologies, tools and techniques in the field of environmental engineering.
- Assume with responsibility and ethics the Environmental Engineer role in a professional context.
- Adapt to changes, being able to apply the principles of Environmental Engineering to unknown cases and use new and advanced technologies and other relevant developments, with initiative and entrepreneurial spirit.
- Carry out theoretical analyzes of environmental systems, both natural and artificial, and develop and apply mathematical models for their simulation, optimization or control.
- Design and calculate engineering solutions to environmental problems, comparing and selecting technical alternatives and identifying emerging technologies.
- Evaluate the treatment of wastewaters emissions to assess different alternatives and obtain the required information for the design of the selected treatment processes.
- Design and manage wastewater treatment systems.

LEARNING OUTCOMES

1 Use the DESASS computer tool.
2 Characterize the influent wastewater and understand its importance for the design and simulation of a WWTP
3 Know the main design and operation variables of a WWTP as well as its effect on the quality of the effluent
4 Evaluate and critically analyze different design and operation alternatives of a WWTP
5 Be able to design a treatment scheme that meets the legal requirements of landfill

DESCRIPTION OF CONTENTS

1. Introduction

2. Elimination of organic matter and nitrification

3. Elimination of organic matter and nitrogen

4. Elimination of organic matter and phosphorus

5. Elimination of organic matter, nitrogen and phosphorus

6. Sedimentation

7. Sludge digestion

8. Design of a complete WWTP

WORKLOAD

ACTIVITY	Hours	% To be attended
Computer classroom practice	21,00	100
Theory classes	6,00	100
Theoretical and practical classes	3,00	100
Development of individual work	20,00	0
Study and independent work	15,00	0
Preparation of evaluation activities	10,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

The training activities will be developed according to the following distribution:

• Theoretical activities.

Description: In the theoretical classes the topics will be developed providing a global and integrating vision, analyzing in greater detail the key aspects and of greater complexity, promoting, at all times, the participation of the student.

• Practical activities.

Description: The practical activities of this subject consist in the realization of computer practices. In these practices students use a simulation program of sewage treatment plants to solve problems related to the design and optimization of this type of installation.

• Student's personal work.

Description: Realization (outside the classroom) of monographic works, directed bibliographic search, issues and problems, as well as the preparation of classes and exams (study). This task will be carried out individually and tries to promote autonomous work.

The e-learning platform (Virtual Classroom of the Universitat de València and / or PoliformaT of the Polytechnic University of Valencia) will be used as a communication support with the students. Through it you will have access to the didactic material used in class, as well as the problems and exercises to solve.

EVALUATION

The evaluation of students will be made from an exam and an academic assignment. The examination consists on the resolution of a biological elimination of nutrients case with DESASS program. The assignment consisting on the design of a complete treatment station so that the required discharge requirements are met. The exam has a weight of 25% and the home assignment of 75% on the final grade. Students who do not pass the exam can retake with the presentation of the assignment at the end of the semester. To pass the subject it is necessary to get an average grade of 5 with a minimum grade of 4 points in each part of the subject.

REFERENCES

Basic

- Tratamientos biológicos de aguas residuales (Ferrer Polo, José | Seco Torrecillas, Aurora)
  -Tratamientos físicos y químicos de aguas residuales (Ferrer Polo, José |
  Seco Torrecillas, Aurora | Universidad Politécnica de Valencia
  Departamento de Ingeniería Hidráulica y Medio Ambiente)
  -DESASS: A software tool for designing, simulating and optimising WWTPs (Ferrer, J. | Seco, A. | Serralta, J. | Ribes, J. | Manga, J. | Asensi, E.|Morenilla, J.J. | Llavador, F.)

ADDENDUM COVID-19

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

English version is not available