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	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
2227 - Master's Degree in Environmental Engineering	School of Engineering	2	First term

Subject-matter

Degree	Subject-matter	Character
2227 - Master's Degree in Environmental Engineering	5 - Optatividad para Especialización	Optional

Coordination

Name	Department
SECO TORRECILLAS, MARIA 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

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

2172 - Master's Degree in Environmental Engineering

- 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 (RD 1393/2007) // NO CONTENT (RD 822/2021)

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 the students will be made from an exam and academic work. The examination consists of solving a case of biological elimination of nutrients with the DESASS program. The academic work consists in the design of a complete treatment plant so that the required discharge requirements are met. The exam has a weight of 25% and the academic work of 75% on the final grade.

Students who do not pass the exam can recover it with the presentation of the academic work at the end of the semester.
To pass the course it is necessary to get an average grade of 5 with a minimum grade of 4 points in each part of the course.

To pass the course, it is necessary to obtain an average grade of 5 with a minimum grade of 4 points in each part of the course.

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

Contents
The contents initially collected in the teaching guide are maintained.

Volume of work and temporary planning of teaching
Regarding the workload:
The different activities described in the Teaching Guide are maintained with the planned dedication.

Regarding the temporary planning of teaching:
The material for the follow-up of the theory classes / classroom practices allows to continue with the temporary teaching planning both in days and in hours (synchronous teaching).

Teaching methodology
In the theory and classroom practices classes will tend to the maximum possible attendance, always

respecting the sanitary restrictions. Depending on the capacity of the classroom and the number of students enrolled, it may be necessary to distribute the students into two groups. In this case, the subject will be taught in classrooms with streaming teaching capacity, and there may be students attending online and in-class students.
A rotation system will be established once the actual enrollment data is known, guaranteeing, in any case, that the attendance percentage of all the students enrolled in the subject is the same.
Regarding computer practices, if the capacity and sanitary conditions allow it, the teaching will be face-to-face. Otherwise, they would be done online.
Once the actual enrollment data is available and the availability of spaces is known, the Academic Committee of the Degree will approve the Teaching Model of the Degree and its adaptation to each subject, establishing in said model the specific conditions in which it will be developed teaching the subject.
If there is a closure of the facilities for sanitary reasons that totally or partially affects the classes of the subject, these will be replaced by non-face-to-face sessions following the schedules established by synchronous video conferencing, or, if not possible, asynchronous.

Evaluation
The evaluation system described in the Teaching Guide of the subject in which the different evaluable 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 health reasons that affect the development of any face-to-face evaluable activity of the subject, it will be replaced by a test of a similar nature that will be carried out in virtual mode using the computer tools licensed by the Universitat Politècnica de València. The contribution of each evaluable activity to the final grade for the course will remain unchanged, as established in this guide.

Bibliography
The bibliography recommended in the Teaching Guide is kept as it is accessible and is complemented with notes, slides and problems uploaded to PoliformaT as subject material.