

Unidade Curricular: Environmental Modeling

Área Científica: ENG

Duração: Semestral

Horas de trabalho: 162

Horas de contacto: 60

ECTS: 6

Docente Responsável: Maria Teresa Loureiro dos Santos

Outros Docentes: Teodoro José Pereira Trindade

Learning outcomes of the curricular unit

This unit aims to provide the students knowledge on the subject of environmental modeling in order to contribute to the environmental assessment of projects as well of the performance of equipment and systems. Upon approval on this unit, students will be able to assess the extension and impact of pollution problems, since its origin to the final reception medium, as also the performance of pollution abatement equipment. They will also be able to select adequate models that will allow them to manage environmental data.

Syllabus

1. Introduction to environmental modeling: types of models, development stages, calibration and validation of models, uncertainties in previsions
2. Air quality and air pollutant dispersion modeling: meteorological modeling; plume rise, atmospheric chemistry, eulerian, lagrangian and Gaussian models; case studies.
3. Hydrologic modeling: modeling of surface waters, modeling of fresh waters, modeling of waste waters; case studies

Demonstration of the syllabus coherence with the curricular unit's learning objectives.

Basic competences intended to be provided to the students are directly connected to each learning theme. Those are to be acquired by attending the classes, executing exercises and performing computational assignments, and, also, by attending the short tests and other evaluation activities associated to each learning theme.

Teaching methodologies (including evaluation)

Teaching is based on classes, simulation laboratory and individual and group work assigned to students. Students are expected to be actively involved in searching basic information of the learning themes as well as in solving application exercises. Evaluation in this unit comprises continuous evaluation: to have approval in the unit one should have a minimum classification of 10 values, in a scale of 0 to 20. The continuous evaluation component comprises 3 assignments/tests and its classification will be obtained as the mean average of the assignments/tests. If a student does not get approval, there will be a written examination that will last 3 hours and comprises all learning themes of this curricular unit.

Demonstration of the coherence between the teaching methodologies and the learning outcomes

Classes are devoted to explanation and debate to the learning themes, and, also, resolution of exercises, computational simulations and case studies. This will allow students to acquire specific knowledge on technologies and equipment to modeling environmental problems.

Mandatory consultation/existence bibliography:

1. Lehr, J., Lehr, J., "Standard Handbook of Environmental Science, Health and Technology", McGraw Hill, New York, 2000
2. Verma, A.K., Process Modelling and Simulation in Chemical, Biochemical and Environmental Engineering, CRC Press, 2017
3. Zannetti, P., "Air Pollution Modelling", Springer, 2013
4. Gomes, J., "Poluição Atmosférica: Um manual universitário", Publindústria, 2ª Edição, Porto, 2010
5. Water Environment Federation, "Wastewater Treatment Process Modeling, Second Edition (MOP31) (WEF Manual of Practice)", McGraw-Hill, 2014
6. Benedini, M., Tsakiris, G., "Water Quality Modelling for Rivers and Streams", Water Science and Technology Library book series, Vol 70, Springer, 2013
7. Droste, R. L., Gehr, R. L. "Theory and Practice of Water and Wastewater Treatment", 2nd Edition, Wiley, 2018