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Professional Software in Environmental Issues

ECTS: 6 ECTS

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UNIVERSITY WHERE THE COORDINATOR IS: USC

HAVE YOU GIVEN PERMISSION TO RECORD YOUR CLASSES? No

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UNIVERSITY WHERE THE LECTURER 1 IS: USC

HAVE YOU GIVEN PERMISSION TO RECORD YOUR CLASSES? No

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UNIVERSITY WHERE THE LECTURER 2 IS: UVigo

HAVE YOU GIVEN PERMISSION TO RECORD YOUR CLASSES? No

SUBJECT CONTENTS

CONTENIDOS:

I) Software MIKE21

- Introduction: framework.

- Generalities.
- Hydrodinamic Module (bidimensional hydrodinamic model of sallow water).
- Incorporating data observed: bathymetry, tide data, wind, etc.
- Viewing and extracting results.
- AD Module (two-dimensional transport model advective / dispersive).
- ECO Lab module (water quality models).

II) Introduction to the methodology of resolution and control of environmental problems FreeFem ++.

- Approach environmental problem.
- Numerical resolution with FreeFem++

III) Introduction to the AERMOD software package for atmospheric dispersion.

METHODOLOGY

Laboratory practices: Classes are necessarily taught in a computer room. In them, the teacher will present the types of problems to be solved, they will display the corresponding mathematical models and point out the elements related to the models to numerically solve them. Students will use software to solve specific problems.

Resolution of exercices and problems: Each student will individually perform the tasks set in lessons. The faculty will address the issues raised by the students and will monitor the work done by each of them,

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LANGUAGE USED IN CLASS: Spanish, Galician

IS IT COMPULSORY TO ATTEND CLASS? In the university where the teacher is.

BIBLIOGRAPHY

1. Bruce Turner, Richard H. Schulze. Practical Guide to Atmospheric Dispersion Modeling. Trinity Consultants, Inc., and Air & Waste Management Association. 2006
2. The Mathematics of Models for Climatology and Environment, Nato ASI Series. I 48, (Díaz, J. I. ed.), Springer Verlag, Berlin, Heidelberg. 1997.
3. D. Francisco Javier Fernández Fernández, "Análisis teórico de ciertos problemas de control y aplicación de la Derivación Automática en su resolución Numérica" Tesis. Dpto. Matemática Aplicada.Universidad de Santiago de Compostela. 2004
4. García Chan, Nestor. "Diferentes estrategias para el análisis y resolución numérica de problemas de gestión medioambiental en zonas costeras". Tesis. Dpto. Matemática Aplicada. Univ. de Santiago de compostela, 2009.

5. Hervouet, Jean-Michel. "Hydrodinamics of free surface flows". John Wiley & Sons, 2007

6. Kundu, "Fluid Mechanics", Academia Press, 1990.

7. Partheniades, Emmanuel "Cohesive sediments in open channels". Elsevier, 2009

8. Samallo Celorio, María Luisa. "Desarrollo e integracion de modelos numéricos de calidad del agua en un sistema de información geográfica".Tesis. Dpto. de Ciencias y Técnicas del agua y del medio ambiente. Univ. de Cantabria. 2011.

9. Stoker, J. J. "Water Waves". Interscience, New York, 1957.

10. Vázquez-Méndez, M. E. "Análisis y control óptimo de problemas relacionados con la dispersión de contaminantes".Tesis. Dpto. Matemática Aplicada.Universidad de Santiago de Compostela. 1999.

11. Visscher, Alex De. "Air dispersion Modeling. Foundations and Applications". John Wiley & Sons. 2014

12. Winterwerp, Johan C.-Van Kesteren, Walther G. M. "Introduction tho the physics of cohesive sediment in the marine environment". Elsevier 2004.

13. Zhen-Gang Ji, "Hidrodinamics and water quality. Modeling rivers, lakes and estuaries". John Wiley & Sons, 2008

Work related to the "Grupo de simulación y control" (https://gscpage.wordpress.com).

Free sotware manuals as well as the bibliography to which they refer.

Note: Other Bibliography will be provided along the course.

SKILLS

Basic:

CG1: To have knowledge that provide a basis or opportunity for originality in developing and / or applying ideas, often within a research context, knowing how to translate industrial needs in terms of R & D in the field of mathematics Industrial.

CG4: To have the ability to communicate the findings to specialist and non-specialist audiences in a clear and unambiguous way.

Specific:

CE4: To be able to select a set of numerical techniques, languages and tools, appropriate to solve a mathematical model.

CE5: To be able to validate and interpret the results, comparing them with visualizations, experimental measurements and functional requirements of the physical engineering system.

Numerical specialization:

CS1: To know, be able to select or use how to handle most suitable professional software tools (both commercial and free) for the simulation of processes in the industrial and business sector.

CS2: To adapt, modify and implement software tools for numerical simulation.

Below you can see a table with all the different teaching methodologies that relate to the achievement of the subject competences:

Teaching methodology	Related skills
Laboratory practices	CG1, CE4, CE5, CS1 y CS2
Resolution of exercises and problems	CG4, CE4, CE5, CS1 y CS2

WILL YOU BE USING A VIRTUAL PLATFORM? No.

WILL YOU BE USING ANY SPECIFIC SOFTWARE? Yes. MIKE21

CRITERIA FOR THE 1ST ASSESSMENT OPPORTUNITY

The tasks to be evaluated:

Exercises performed in class: attendance at classes is mandatory. The interrelation of the student with the teacher is done with small tasks proposed by both. Your evaluation will represent 10% of the final qualification.

Individual-work: exercises that the teacher can propose throughout the course. Your evaluation will represent 30% of the final qualification.

Final exam: Examination of contents of the subject. Your evaluation will represent 60% of the final qualification.

In the following table, each of the evaluation elements of the subject is related to the competencies that are being evaluated:

Activities to evaluate	Related skills
Exercises performed in class	CG1, CE4, CE5, CS1 y CS2
Individual-work.	CG4, CE4, CE5, CS1 y CS2
Final exam	CG1, CG4, CE4, CE5, CS1 y CS2

CRITERIA FOR THE 2ND ASSESSMENT OPPORTUNITY

The contents of the subject will be assessed by means of an exam (100% of the total mark).