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INTEGRATION OF ICT TOOLS IN AN ENGINEERING POSTGRADUATE MASTER PROGRAM

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Introduction

Structural and methodological implications of the European Higher Education Area constitute a new interplay between students and lecturers.

- *Lecturer*-- learning counselors
- *Students*-- actively participate in their learning process instead of being passive receptors of knowledge as in conventional teaching systems

Computer tools

Information and Communication Technologies

Interactive Characteristics

Aims

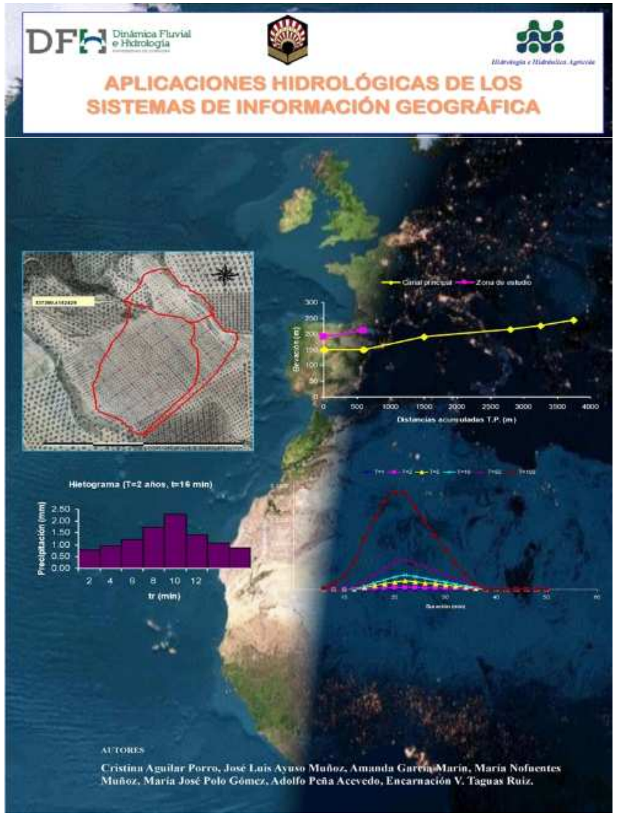
This work presents the combination and integration of three ITC initiatives carried out and applied within the Master Program on Environmental Hydraulics for the acquisition of capacities and abilities in the autonomous apprenticeship of courses related to Engineering and Hydrological studies

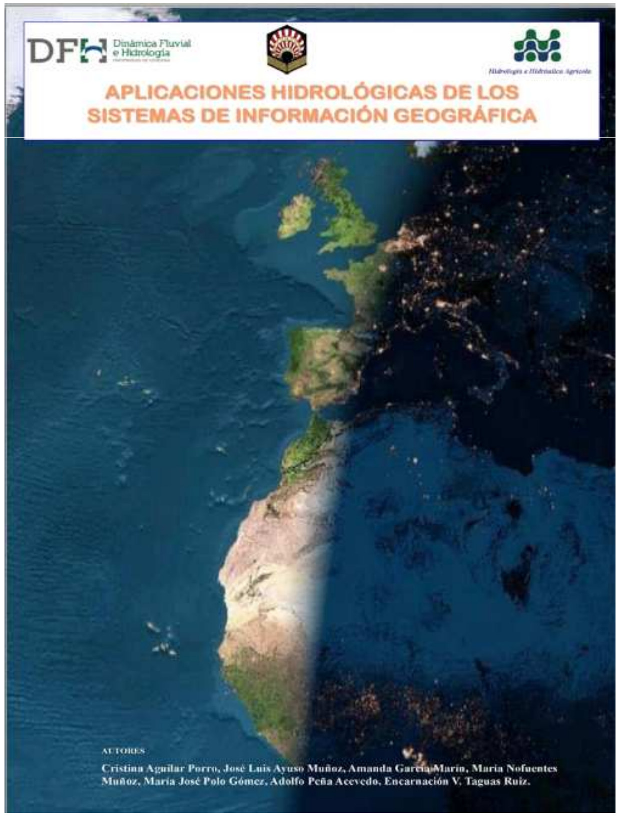
1. E-book: GIS for hydrological studies
2. Self-assessment tool: to constantly lead and support the resolution of a real study case through hydrological modeling
3. 3D interactive graphic tool: to acquire training and experience in Engineering Project Management

1. e-book

Basic principles and utilities of Geographical Information Systems in hydrological studies can be found.

Files are included in order to carry out a complete guided study case.





2. Self-assessment tool

Developed in order to constantly lead and support the resolution of a real study case through hydrological modeling.

Once the lecturers posed and solved a study case, the self-assessment tool was developed allowing the students:

- To access suggestions step by step along the resolution process
- To evaluate the results obtained before the final deadline
- To look up other previously solved cases, frequent questions and bibliography (e.g. the e-book in section 1).

2. Self-assessment tool

Students:

- Face the difficulty of a hypothetical hydrological study as in the real world (instead of classroom exercises)
- Have to follow the basic steps in hydrological studies
- Use the technical and computer tools commonly used
- Make decisions when data are lacking or with technical difficulties, etc.

Lecturers:

- Encourage and promote and autonomous decision-making process by the students

3. 3D interactive graphic tool

Engineering Project Management involves a great *variety of activities*: from the very physical computations, to the economic assessment of each unit cost of the structures and materials to be used.

Conventional teaching systems make it *difficult* the acquisition of training and experience in Engineering Project Management as they take place mainly in the *classroom:* The lecturer has to do an extra effort so that students get to learn and keep in mind every single step and their relationships at the same time.

In order to practice and get to know real projects in development, the lecturer can organize field trips.

Development of a virtual tool for the telematic training in the steps to follow in a typical engineering project. e.g. Designing an agro-industrial building

3. 3D interactive graphic tool

Aims of the tool

- Identify the most important contents of a project document: Calculates, norms, views and economic budgets
- Decide which activities will make up the project as well as their relationships and schedule

Essential knowledge for students in Engineering Project Management in order for them to become acquainted with the equipment, its temporal configuration, principal parts and limitations

3. 3D interactive graphic tool

Stages

1. The student can study a virtual, interactive example, where the views of building, its measures, the cost of its components and the steps of the building process are presented.
2. A practical case is presented with different criteria of design.

Conclusions

1. The practical experience with the three of them has been very positive in the last two academic years.
2. The inclusion of ICT in the conventional teaching systems provides connectivity, flexibility and instantaneous responses through self-analysis which is well-valued by the students.
3. The autonomous approach in the apprenticeship and the use of the ICT tools stimulated the development of personal abilities, the analysis of information and the synthesis of the design process, elaboration and execution of a project or study case.
4. The execution time was optimized by the students, avoiding constant direct contact to the lecturer and the risk associated to field campaigns.
5. These tools are always available online (Moodle, Personal web pages, …)

Future lines of work

1. A practical example in order to evaluate the students will be added as well as video recordings and 3D simulations.
2. Next example to be included in the 3D graphic tool: the design of a dam at the outlet of a headwater basin.

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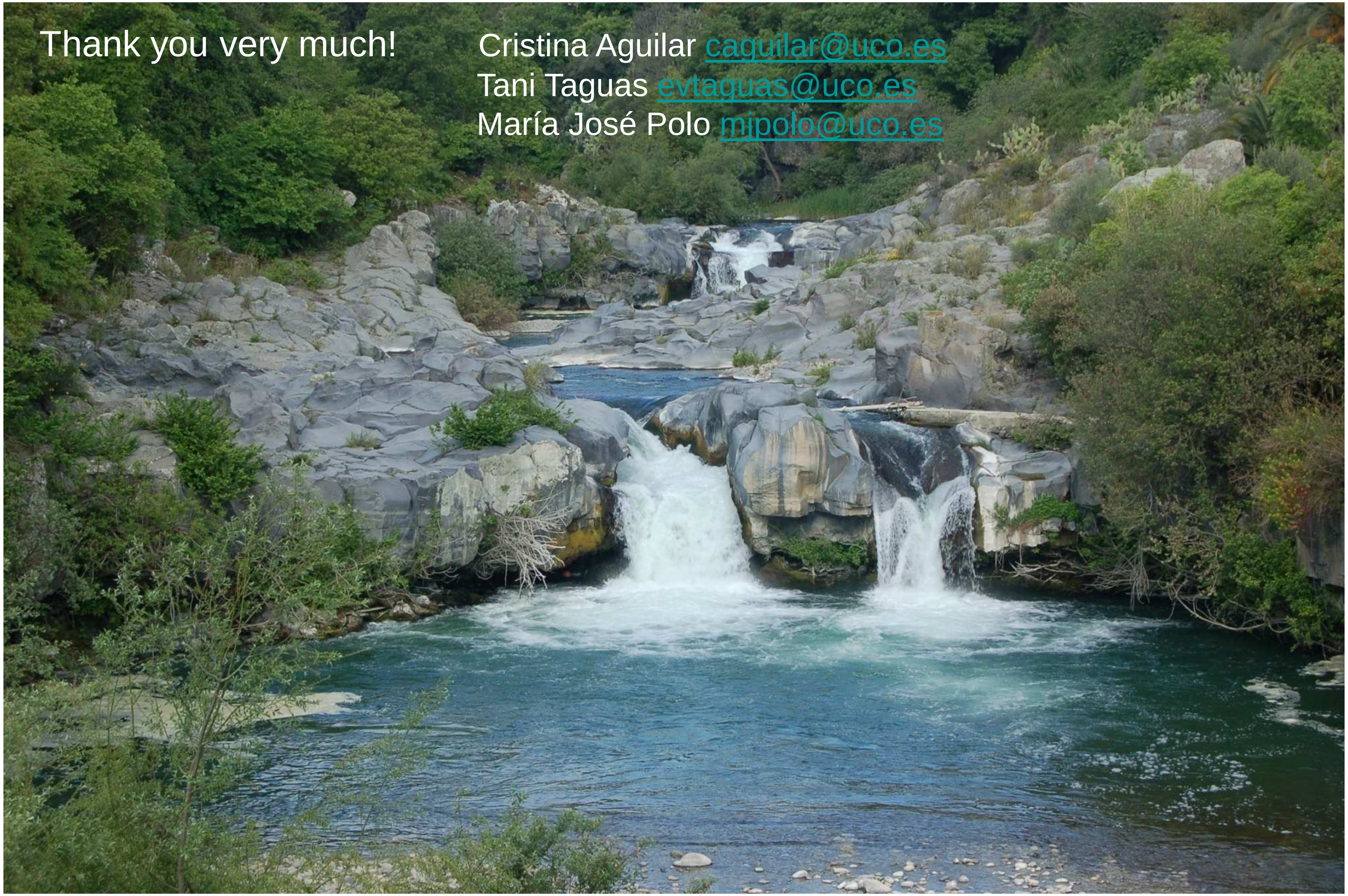

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