HECRAS AND ARCGIS 10 COURSE FOR HYDRAULIC MODELLING (GEORAS)
This course will qualify students in the management of HEC-RAS, one of the most extended hydraulic modelling software’s and its ArcGIS extension (HEC-geoRAS).

Students will be trained in the basic modelling of prismatic channels and natural riverbeds, as well as learning to simulate different hydraulic constructions. The student will also learn how to use the HEC-geoRAS extension with the goal of estimating different hydraulic parameters and defining a simulation environment.

**TRAINING OVERVIEW**

**GOALS**

- Understand the importance and uses of hydraulic simulation models.
- Comprehend the essential concepts for the management of HEC-RAS.
- Study, through practical exercises, HEC-RAS capacities in the flow modelling of artificial and natural water courses.
- Demonstrate how different engineering works over the course of a river modify floods according to them.
- Indicate the possibilities offered by HEC-geoRAS when processing georeferenced data to facilitate and complement the study done with HEC-RAS.

**STUDENT PROFILES**

This course is aimed at students and professionals related to geology, engineering, topography, geography and environmental sciences interested in the use of Geographic Information Systems for their professional activities.

**Important note:** this course requires previous ArcGIS Desktop knowledge.
Online Format Methodology

The online format uses the online learning and technological platform Moodle, a telematics tool that works through the internet. It is a learning platform that provides students access to the training course content, fulfill the practical cases and consult the teaching staff, as well as availability to the resources and help at any moment.

The platform is available 24 hours a day, through which the student will be able to ask for help at any given moment. Instructors will reinforce the student’s autonomy during its training process, supporting and clarifying any possible doubts that may arise along the course.

Therefore, the course is carried out through different areas available on the online platform and where the student can search for training material, download information, complete the practical exercises and take assessments to verify the assimilated knowledge. The teachers will offer progressively the basic information needed to work towards the completion of a final practical case.

Instructor

Martín Núñez Pérez

Civil engineer with specialization in Hydraulics and Energy, several years of experience in drafting hydraulic works, technical consulting in hydrology and design of hydraulic works and management of geographic information systems.

He has participated in many projects of hydraulic and hydroelectric infrastructures of national and international scope, as much in hydrological planning as in design and dimensioning of hydraulic infrastructure.

In the professional field, has specialized in the management of various types of hydraulic and hydrological modeling software as well as for the sizing of hydraulic works.
1 - BASIC CONCEPTS OF HYDRAULIC MODELLING
Introduction
Open channel movement of a fluid.
Concepts of Energy Height and Head losses.
Manning formula for channels
Variable, permanent, varied and Uniform flow regime
Control sections and Boundary conditions
Guided exercise to understand the concepts of Unit 1.

2 - FIRST STEPS. INTRODUCTION TO HEC-RAS
Introduction
HEC-RAS mathematical and physical principles
Advantages and disadvantages of the program.
Software installation.

3 - BUILDING A BASIC HYDRAULIC MODEL IN HEC-RAS
Introduction
Initial interface
Creating a new project
Definition of geometry
Defining the flow and boundary conditions
Simulation
Viewing the results
Location of geometry and flow files in windows
Checking calculations
Guided exercise to understand the concepts of Unit 3.

4 - ADVANCED GEOMETRY
Introduction
Cross sections editing tools from the options menu.
Manning coefficients definition
Definition of structures in cross sections
Using quick data tables
Cross Section Interpolation
Section inversion
Importing geometries
Guided exercise to understand the concepts of Unit 4.

5 - DIGITAL ELEVATION MODELS AND ARCGIS
Introduction to ArcGIS
Using ArcGIS to create a Digital Elevations Model.
ArcGIS Hydrologic tools
Summary of processes
Guided exercise to understand the concepts of Unit 5.

6 - CREATING AND IMPORTING GEOMETRIES USING GeoRAS
Introduction
Downloading and activating the GeoRAS extension in ArcGIS
Generation of a geometry
Exporting geometries to HEC-RAS
Guided exercise to understand the concepts of Unit 6.

7 - MODELLING HYDRAULIC WORKS
Introduction
Theoretical bases
Bridges and culverts
Inline structures, weir and gates.
Lateral structures
Multiple reaches and junctions in channels and rivers.
Guided exercise to understand the concepts of Unit 7.

8 - ADVANCED DEFINITION OF THE FLOW REGIME
Introduction
Previous theoretical concepts
Editing flows and profiles in steady flow regime
Boundary conditions
Plans and hypothesis
Simulation
Guided exercise to understand the concepts of Unit 8.

9 - VIEWING RESULTS
Introduction
Output tables
Profiles and cross sections diagrams
Graphics
Three dimensional channel views
Guided exercise to understand the concepts of Unit 9.

10 - WARNING AND ERRORS
Introduction
Identifying errors
Identifying alarms and notifications
Conclusions