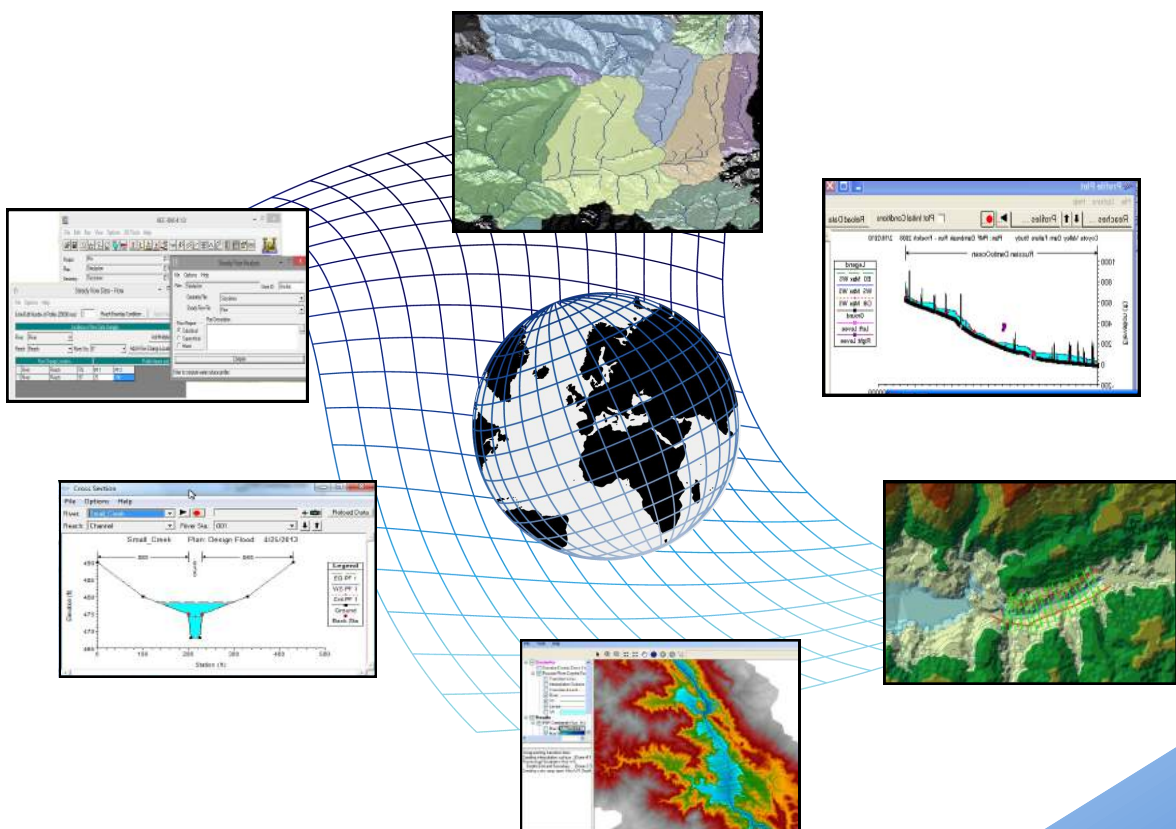


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# HYDRAULIC MODELLING TRAINING COURSE WITH HEC-RAS AND ARCGIS

ONLINE FORMAT



*Professionals training  
Professionals*

**2017**

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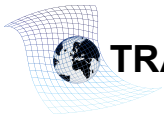
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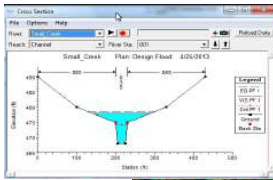
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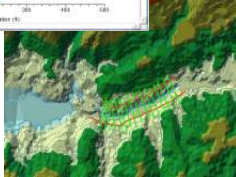
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## TRAINING COURSE OVERVIEW



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).



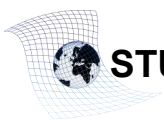
Students will be trained in the basic modelling of prismatic channels and natural riverbeds, as well as learning to simulate different hydraulic constructions. The student will also learn how to use the HEC-geoRAS extension with the goal of estimating different hydraulic parameters and defining a simulation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

environment.



## GOALS

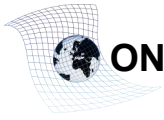
- Understand the importance and uses of hydraulic simulation models.
- Comprehend the essential concepts for the management of HEC-RAS.
- Study, through practical exercises, HEC-RAS capacities in the flow modelling of artificial and natural water courses.
- Demonstrate how different engineering works 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 the engineering sector interested in the management of one of the most used software's for hydraulic modelling.



## 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, fulfil 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.

With this method, once the student progresses and has faced the resolution of different practical exercises consistent with the course outline, 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

## COURSE OUTLINE

### 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

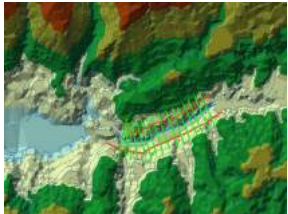
**Guided exercise to understand the concepts of Unit 1.**



### 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

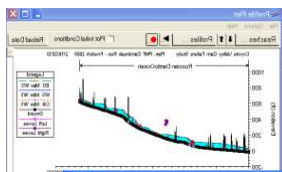
**Guided exercise to understand the concepts of Unit 3.**



### 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.**



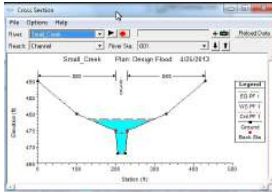
### 5 - DIGITAL ELEVATION MODELS AND ARCGIS

- 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.**



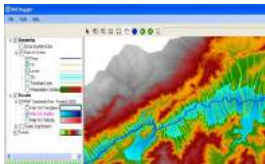
## 6 - CREATING AND IMPORTING GEOMETRIES USING GeoRAS



- 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