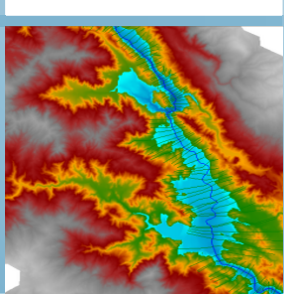
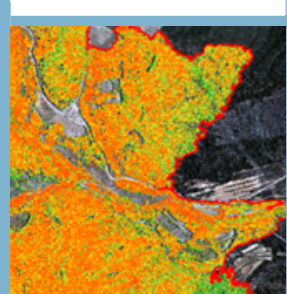
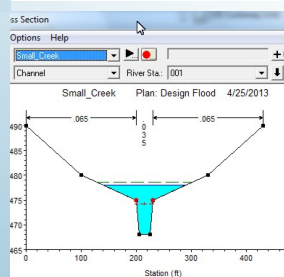
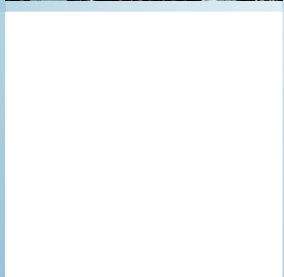
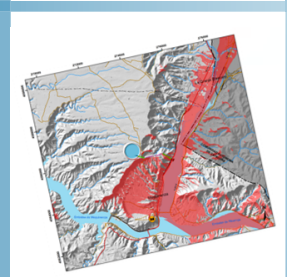
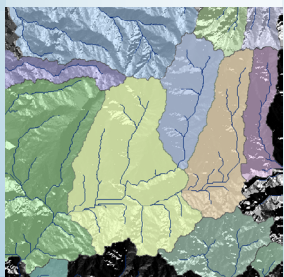
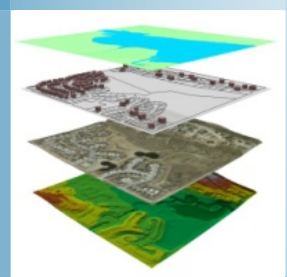
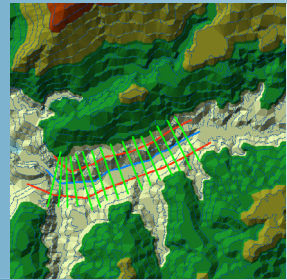
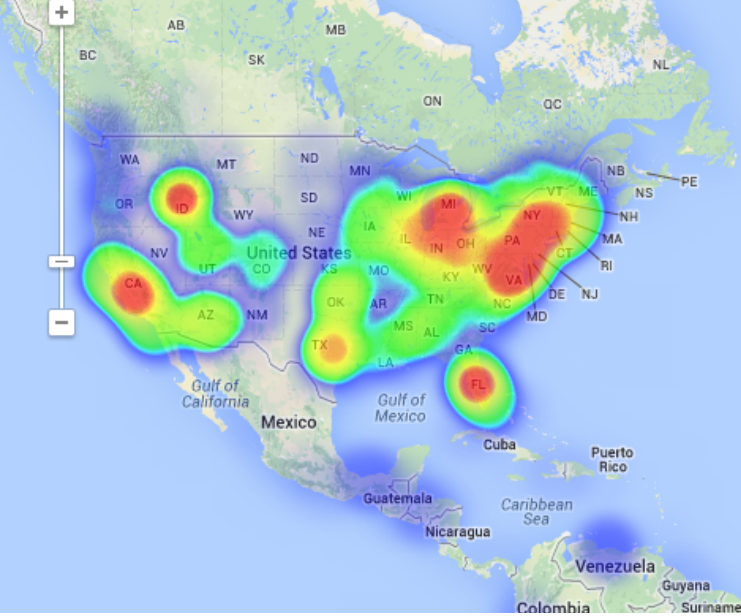
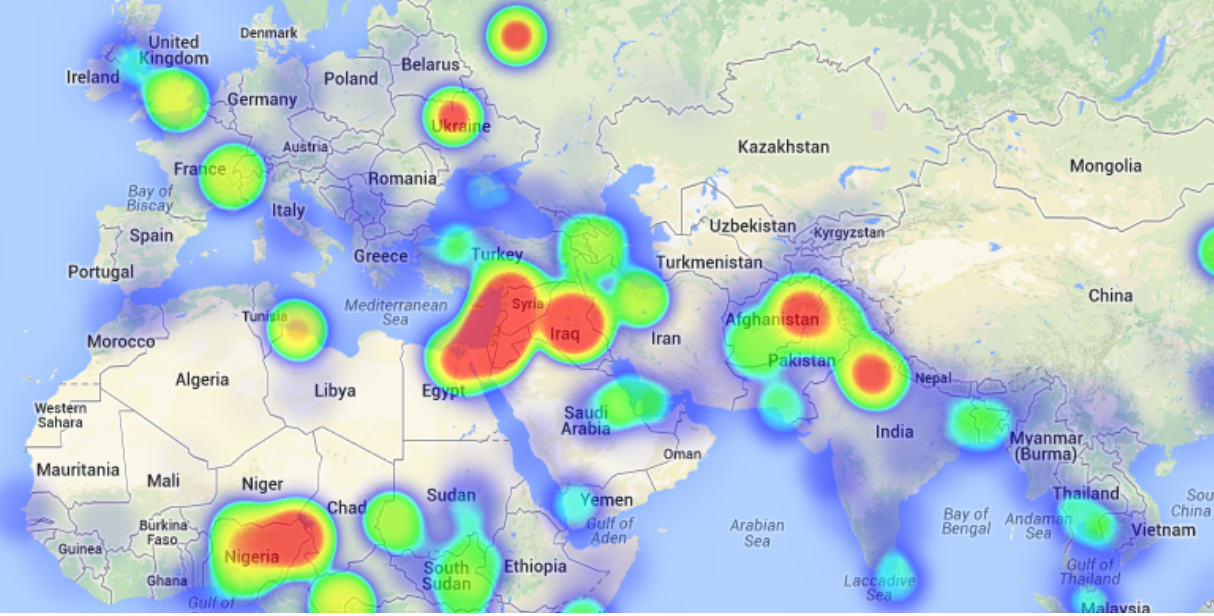


# HECRAS AND ARCGIS 10 COURSE FOR HYDRAULIC MODELLING (GEORAS)





North Atlantic Ocean



## TRAINING 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.

## 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.**

## 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.





## 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



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