**Scuola di Dottorato del Politecnico di Bari**

**Ph.D. School**

**Lab-and-field data acquisition and processes in Hydraulics**

**CFU 3 (24 ore)**

**SSD: ICAR/01**

Goal. The course provides the basic concepts necessary to carry out measurements, process data and derive hydrodynamic and physical meanings form large data sets.

Program. The following topics are studied, combining theory and practical examples.

Measurement definition and concept. Measurement instrumentation and sensors. Sources of error. Measurement uncertainty.

Measurement in static and dynamic conditions.

Instrument calibration. How to get a calibration curve from laboratory data.

Sensitivity, accuracy and precision. Measurement range and frequency response. Instrument precision. Measurement error. Theory of errors.

How to carry out a measurement. Nyquist theorem. Sampling duration.

Signal analysis in time and frequency domain. FFT and IFFT. How to obtain a spectrum of the measured signal with FFT technique.

Acquisition signal chain. Control and management of remote measuring stations, with sensors sampling hydrodynamic parameters.

Acoustic and laser signal sources. Doppler effect. Measuring flow velocity with LDA and ADV sensors. Practical trials at the *Coastal Engineering Laboratory – LIC* of the DICATECh and analysis of acquired data.