

## PhD programme in Earth, Environmental and Resources Sciences

Instructor(s)	Ettore Valente, DiSTAR - UNINA
Course Title	Morphometrical and morphotectonic approach for the reconstruction of the spatial distribution of vertical motions
Total Number of Hours	12
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### Course Description

The course aims to help Ph.d candidates getting familiar about the main topics in morphotectonics analysis. Moving from the principles of tectonic geomorphology, the course will introduce the main methods for the reconstruction of the spatial distribution of vertical motions. Methods include GIS-aided and Matlab analysis of the topography and river network. Students will face case studies from different morphotectonic settings spanning from the orogen scale to the analysis of detailed portions of the landscape (i.e., mountain front, hydrographic basins, tectonic depression).

### Course Contents

1. Module / Principles of tectonic geomorphology – From the Davis' model to the Strahler order of hydrographic basin
2. Module / Morphometrical analysis of the topography – Topographic profile and swath profile, elevation map and its derivative (maximum, medium, minimum and relief maps), mountain front analysis
3. Module / River network metrics – River long profile, knickpoints, transformed river long profile ( $\chi$ -profile), Ksn and concavity indexes, inversion of river long profile
4. Module / Case studies – Topography and river networks metric for the reconstruction of spatial distribution of vertical motions in different morphotectonic settings

### Learning Outcomes

By the end of the course, doctoral students will be able to:

- discern about the role of lithology and tectonics on the spatial distribution of topography and river network metrics
- interpret the spatial distribution of topography and river network metrics in term of

vertical motions

- discern between rock uplift, surface uplift and rock exhumation

## Teaching Format

Lectures and discussion of scientific papers

## Essential Bibliography

- Burbank, D.W., Anderson, R.S., Tectonic Geomorphology. Blackwell, Oxford, 2012
- Schumm, S.A., Dumont, J.F., Holbrook, J.M., Active tectonics and alluvial rivers. Cambridge University Press, Cambridge, 2000

## Assessment Method

In-class discussion.