PHD COURSE

INTEGRATED RIVER MORPHODYNAMICS

Morphodynamics of River Bars and 1-D bedforms
Integrating Theories, Modelling, and Observations

DICAM, UNIVERSITY OF TRENTO, ITALY

February 10-14, 2020

The course is at its 4th edition and it is offered within the Doctoral School of Civil, Environmental and Mechanical Engineering of the University of Trento, Italy.

The general aim of the course is to show how the integration of different approaches can lead to a comprehensive insight into river morphodynamics.

The course strategy is to focus on specific morphodynamic patterns, which for this edition will be (i) alternate bars in channelized streams and (ii) 1D bedforms, a subset of patterns related with river morphodynamics that can be taken as an example of other patterns evolving at different time and spatial scales.

INSTRUCTORS

- Guido Zolezzi, Walter Bertoldi, Annunziato Siviglia (University of Trento)
- Marco Colombini (University of Genova)

CONTENTS:

- Basics of theoretical river morphodynamics
- Analytical theories of river bars: an overview of assumptions and outcomes
- Analytical methods for 1D, small-scale bedforms (dunes, ripples, …)
- Development of a linear stability analysis for free bars in straight channels
- Bars in real rivers: processes, forms and implications for river behavior
- Examples of numerical simulations of river bars

At the end of the course, participants are expected to:

- Have developed an understanding of how to integrate multiple approaches to investigate morphodynamics of river bars and small-scale 1D bedforms

- Have learned the "machinery" that lays behind the linear stability analysis of free bars, and, more in general, behind linear stability analyses in morphodynamic problems, also with reference to 1D bedforms
- Are able, individually or in small groups, to develop and use a simple computational tool to predict the main properties of free bars in straight channels.

The course is suitable for graduate students with a background in fluid mechanics, civil and environmental engineering, physical geography, environmental and physical sciences, including young scientists and professionals with an interest in increasing their knowledge of river morphodynamics.

REQUIRED BACKGROUND

A basic knowledge of the following is required:

- Basic calculus, particularly ordinary and partial differential equations
- Basic of fluid mechanics, particularly equations for momentum and mass conservation
- (preferred) Basic knowledge of sediment transport processes and fundamental equations

The course starts on Monday, February 10th 2020 at 10.30 and finishes Friday, February 14th at 3.30pm

The course duration is 32 hours

Registration to the course is required to participate and is free of charge.

To register, please send an email and CV to dicamphd@unitn.it