

# INTERNATIONAL SUMMER SCHOOL

Capri - July, 11-14, 2023



**UNIVERSITY OF NAPLES  
FEDERICO II**

Department of Structures for  
Engineering and Architecture

Within the courses of the Ph.D.  
program in *Structural & Geotechnical  
Engineering and Seismic Risk*

## DATES

11-14 July 2023

24 hours (3 CFU)

## LOCATION

Villa Orlandi, Capri Island – Italy  
*Via Finestrale, 2, 80071 Anacapri NA*

## CHAIRS

**Costantino Menna**

University of Naples Federico II

**Freek Bos**

Technical University of Munich

## WHO SHOULD ATTEND

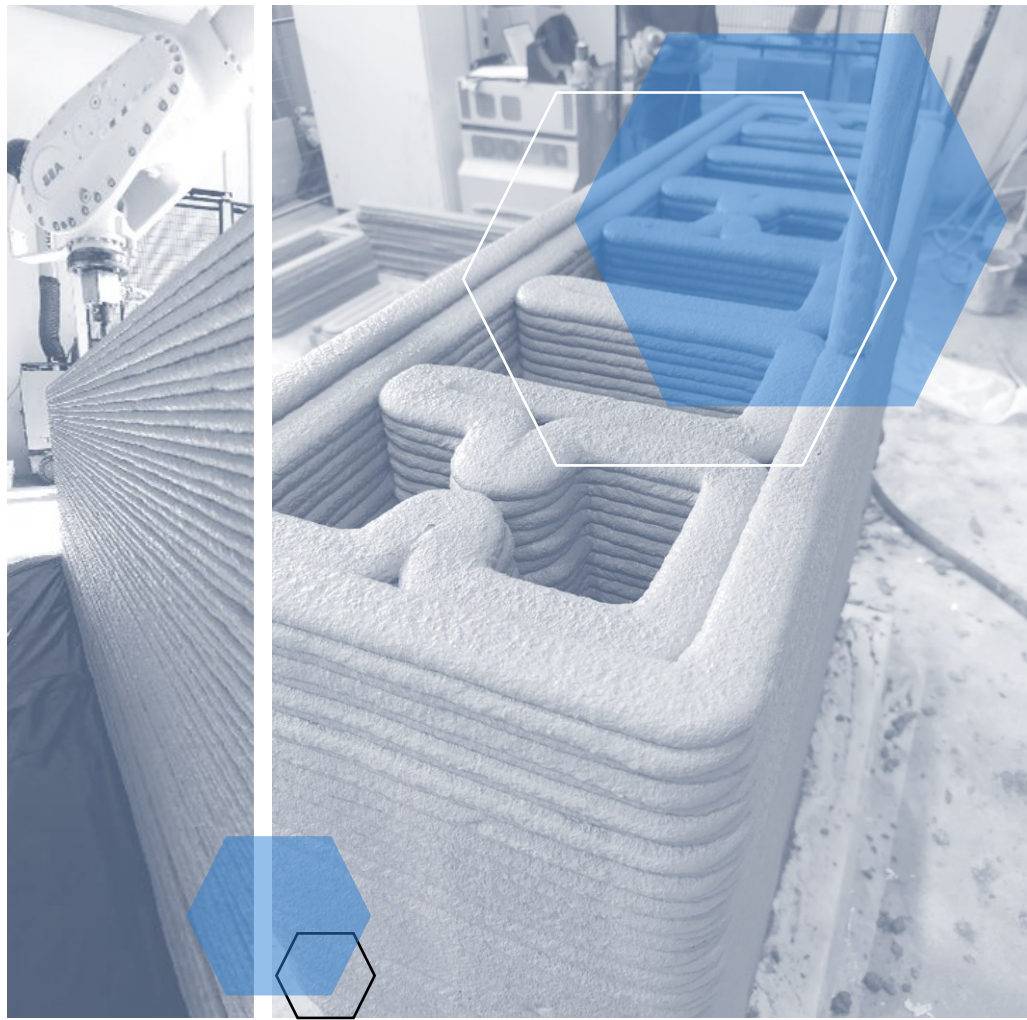
Ph.D. students, postdoctoral  
researchers, practitioners interested  
in research and applications of  
additively manufactured structures

## CONTACTS

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## ADDITIVELY MANUFACTURED CONCRETE STRUCTURES

### AIM and SCOPE

The additive manufacturing (AM) of cementitious materials, particularly through the technique of 3D Concrete Printing (3DCP), is rapidly expanding in the construction industry with relevant developments in the material and production technologies as well as in the advanced design of high TRL projects. In order to match the design intent with 3DCP manufacturing capabilities, several aspects must be taken into account, such as control of the material at the fresh state, structural analysis including reinforcement, robustness and integration on a large scale of the applications.

At present, there is a strong need to build robust academic knowledge in researchers who are involved in the digital design-to-fabrication process of novel 3D printed structures. In fact, the growth of technological and engineering expertise on 3DCP can potentially improve the awareness in the construction field, thus maximizing the socio-economic-environmental impact associated to its effective implementation.

The main goal of the Summer School is to offer the most advanced technical background - analytical, numerical and practical - on structures and infrastructures achievable by using 3DCP.

### INTERNATIONAL LECTURERS

**Costantino Menna** - University of Naples Federico II (Italy)

**Freek Bos** - Technical University of Munich (Germany)

**Arnaud Perrot** - Université Bretagne Sud (France)

**Jacques Kruger** - Stellenbosch University (South Africa)

## COURSE OUTLINE

## REGISTRATION

Registration at: [bit.ly/3R3SVNZ](https://bit.ly/3R3SVNZ)

Deadline: April 30, 2023

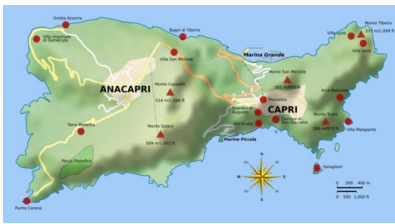
Registration fee: 350 €

## VENUE

The summer school will be held in Villa Orlandi in Anacapri, a small village located in the island of Capri, in the Metropolitan City of Naples, Italy.



Anacapri is widely known for its picturesque, rural tranquility, broad views of the Bay of Naples, and significant historic sites, including Villa San Michele.



Villa Orlandi is an architectural building in which themes and models of the traditional Capri house converge. Its original structure dates back to the first decades of the eighteenth century, when the new church of San Michele was built in the nearby Carmenlitane convent complex.



Nowadays, the structure belongs to the Congress Center of the University of Naples Federico II.



The main topics addressed in the summer school are:

- Additive Manufacturing processes
- Construction materials adopted in 3DCP
- Rheological requirements to control the printing process
- Mechanical-physical characterization in the fresh state
- Mechanical-physical characterization in the hardened state
- Analytical and numerical modeling of the printing process/layered structure
- Reinforcement technologies
- Structural optimization based on free-form capabilities
- Structural analysis and approval in large-scale applications
- Examples from practice

## PRELIMINARY COURSE SCHEDULE

### Tuesday July 11, 2023

12.00 – 12.30: Registration

12.30 – 13.30: Welcome aperitif

14.30 – 15.30 | *Menna*: 3DCP – Introduction and history

15.30 – 16.30 | *Bos*: AM processes (extrusion, spraying, powder bed)

16.30 – 17.30 | *Kruger*: How to print & cure (tools and equipment)

### Wednesday July 12, 2023

09.00 – 11.00 | *Perrot*: Materials & Rheology – basic principles

11.20 – 13.20 | *Perrot*: Materials & Rheology – modeling and applications

14.30 – 16.30 | *Kruger*: Fresh state characterization – Part I

16.30 – 17.30 | Fresh state: practice and exercises

### Thursday July 13, 2023

09.00 – 10.00 | *Kruger*: Fresh state characterization – Part II

10.00 – 11.00 | *Kruger*: Modeling of printing process

11.20 – 13.20 | *Bos*: Hardened state characterization

14.30 – 16.30 | *Menna*: Structural Optimization

16.30 – 17.30 | Hardened state: practice and exercises

### Friday July 14, 2023

09.00 – 11.00 | *Bos*: Reinforcement technologies

11.20 – 13.20 | *Menna*: Structural analysis and approval

14.30 – 15.30 | *Bos*: Examples from practice

15.30 – 17.30 | Practice and final exam

## SUGGESTED HOTELS

The list will be updated in the next few weeks. However, being July high season in Capri, applicants are encouraged to check accommodation availability on the island.

## DETAILS

Please check periodically the link below for updates and further instructions.

[http://www.dist.unina.it/en\\_GB/dottorati-di-ricerca/corsi-di-dottorato/a.a.-2022-2023](http://www.dist.unina.it/en_GB/dottorati-di-ricerca/corsi-di-dottorato/a.a.-2022-2023)

## PARTNERS

Coming...

## ADMINISTRATIVE STAFF

*Dott.ssa* Immacolata Diez - [immacolata.diez@unina.it](mailto:immacolata.diez@unina.it)

*Dott.ssa* Valeria Peluso - [valeria.peluso@unina.it](mailto:valeria.peluso@unina.it)

