

PhD Course in Waves in Metamaterials and Periodic Structures

Course Program

Wednesday April 12 – Room 1H – 9:00-16:00

Prof. Francesco Dal Corso

- One-dimensional mechanical wave equation
- Discrete one-dimensional systems (the monoatomic and the diatomic chains)
- Two and three dimensional discrete systems

Dr. Vinicius Fonseca Dal Poggetto

- Bioinspired hierarchical metamaterials (introduction to the Fet Open Boheme project coordinated by Unitn/Dicam/Nicola Pugno)
- Modelling wave propagation in one-dimensional periodic media
- Two-dimensional wave propagation in plate structures
- Acoustic applications of metamaterial plates

Thursday April 13 – Room 1H – 9:00-13:00

Prof. Giacomo Oliveri

- The nature of Electromagnetic Waves – Maxwell's Equations and the EM Wave Equation
- Canonical Solutions to Maxwell's Equations: Plane Waves in Homogeneous Media
- Waves and planar interfaces? The Snell's Laws
- Periodic and Quasi-Periodic Metamaterials: concept, design, implementation
- Waves and Metamaterials - the Generalized Snell's Laws
- Applications of Generalized Snell's Laws to Wave Control in EM Systems

Friday April 14 – Room 1H – 9:00-16:00

Prof. Oreste S. Bursi

- Seismic metamaterials for vibration mitigation of process plant components
- Motivation
- Metamaterial Concept
- Importance of experiments
- Modeling and machine learning
- Structural (passive) control
- Random vibration
- Optimization
- Attenuation and non attenuation zones
- Vibration mitigation of liquid storage tanks
- Vibration mitigation of small modular reactors
- Non-linear issues
- Conclusions and Outlooks

Dates: April 12-14, 2023

Location:

Department of Civil, Environmental and Mechanical Engineering. Via Mesiano 77, Trento

Duration: 16h in total

ECTS: 2

Acknowledgments

This PhD course is supported by the European Union's Horizon 2020 research and innovation programme under the European Research Council grant agreement 'BEYOND - Beyond hyperelasticity: a virgin land of extreme materials' ERC-ADG-2021-101052956-BEYOND, the Marie Skłodowska-Curie grant agreement 'INSPIRE - Innovative ground interface concepts for structure protection' PITN-GA-2019-813424-INSPIRE, and Project "National Centre for HPC, Big Data and Quantum Computing (CN HPC)" funded by the European Union - NextGenerationEU within the PNRR Program (CUP: E63C22000970007). The Lecturers acknowledge the Italian Ministry of Education, Universities and Research (MUR) in the framework of the project DICAM-EXC (Departments of Excellence 2023-2027, grant I.232/2016).

In order to register to the course please send an email to dicamphd@unitn.it