

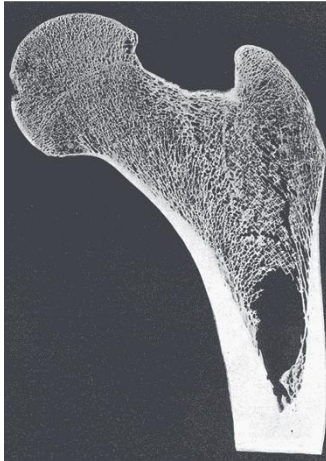


Course announcement

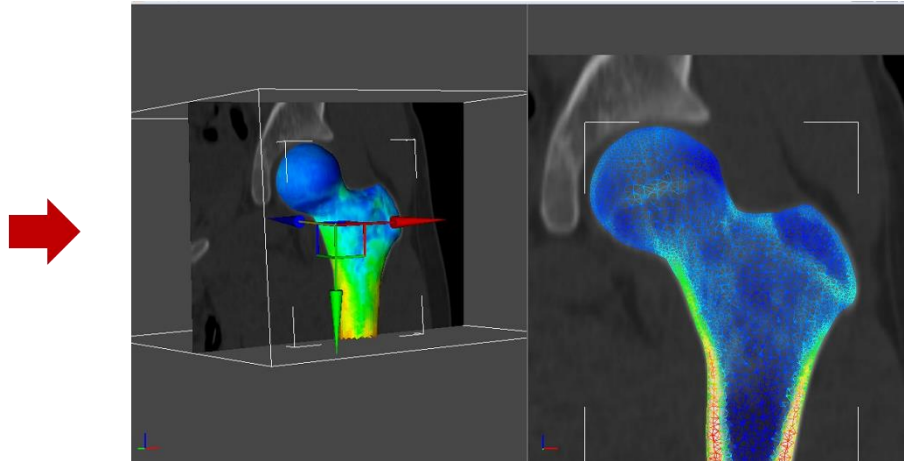
Modelling of physical systems for engineering "Computational mechanics for hard biological tissues: towards a patient-specific modeling"

Prof.ssa C. Falcinelli & Prof. Marcello Vasta

CT imaging



CT-based FE-derived model



Hours 8 - cfu

Classes will be in English
Compulsory attendance

Is required that the attendance write a final brief essay based on a specific aspect discussed during the course. The topic of the brief essay will be furnished on the first day. The brief essay is compulsory to obtain cfu.

"Computational mechanics for hard biological tissues: towards a patient-specific modeling"

The mathematical three-dimensional (3D) modeling represents a powerful predictive tool for identifying the critical issues in terms of stress and strain for any system as the biological tissues. About the biological systems, the 3D modeling allows us to investigate the mechanical response of healthy and pathological tissue and develop mechanical-based indices to use in the clinical practice to overcome the limitations of the current clinical standards and thus improve the treatment and diagnosis of pathologies. However, the biological tissues are characterized by a hierarchical (multiscale) organization and by continuous growing and remodeling processes. Moreover, to develop accurate models it is necessary that the model is subject-specific. The course will instruct on the 3D modeling of healthy and pathological bones starting from diagnostic data. In the first part of the course, participants will be introduced to basic concepts of mechanics to characterize the mechanical response of bone and concepts of finite element modeling. Moreover, the essential aspects of bone tissue that must be incorporated into the model will be illustrated. In the second part of the course, participants will be introduced to the 3D FE-based subject-specific modeling of bones with the use of some software such as ITKsnap, Comsol, and Matlab.

OBJECTIVES: The aim of the course is to furnish an overview of the creation of bone finite element models from 3D diagnostic images and how to use computational simulations to investigate bone mechanical behavior in healthy and pathological conditions. The ultimate aim is to give an idea of how and to what extent computational simulations can be used in clinical practice to improve the diagnosis and treatment of pathologies.



✉ **Register by** sending email to:
tea.taraborelli@unich.it & cristina.falcinelli@unich.it (in cc)

*For those not at University of Chieti-Pescara it is possible to follow the short course online:
specify request when you register.*

TIMETABLE			
WEDNESDAY	25 September	9:30	12:30
WEDNESDAY	16 October	9:30	12:30
WEDNESDAY	23 October	9:30	11:30