



NONLINEAR COMPUTATIONAL MECHANICS

Anno immatricolazione	2017/2018
Anno offerta	2018/2019
Normativa	DM270
SSD	ICAR/08 (SCIENZA DELLE COSTRUZIONI)
Dipartimento	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
Corso di studio	BIOINGEGNERIA
Curriculum	Bioingegneria delle cellule e dei tessuti
Anno di corso	2°
Periodo didattico	Secondo Semestre (06/03/2019 - 14/06/2019)
Crediti	6
Ore	51 ore di attività frontale
Lingua insegnamento	Italiano
Tipo esame	SCRITTO E ORALE CONGIUNTI
Docente	AURICCHIO FERDINANDO (titolare) - 2 CFU MORGANTI SIMONE - 2 CFU REALI ALESSANDRO - 2 CFU
Prerequisiti	A good knowledge of the basic concepts given within the courses of Mechanics of Solids and Structures, Numerical Analysis, and Computational Mechanics is required.
Obiettivi formativi	This course aims at giving a concise introduction to the basic concepts of nonlinear mechanics of solids and at providing the basic ingredients to perform simulations of solid mechanics problems at large strains via the finite element method.
Programma e contenuti	Basics of nonlinear mechanics Kinematics Equilibrium

Hyperelastic constitutive laws
Elements of numerical analysis
Solution of nonlinear equations and systems
Matlab implementation of basic algorithms
Nonlinear finite elements
Basic concepts
Application to 1D rods at large strains (and Matlab implementation)
Application to 2D plane strain problems at large strains (and Matlab implementation)
Use of a commercial nonlinear finite element code

Metodi didattici

Blackboard lectures and Matlab-based hands-on tutorials.

Testi di riferimento

Suggested references are (among others):

J. Bonet, R.D. Wood. Nonlinear Continuum Mechanics for Finite Element Analysis. Cambridge University Press.

O.C. Zienkiewicz, R.L. Taylor, J.Z. Zhu. The Finite Element Method: Its Basis and Fundamentals. Elsevier.

O.C. Zienkiewicz, R.L. Taylor, J.Z. Zhu. The Finite Element Method for Solid and Structural Mechanics. Elsevier.

P. Wriggers. Nonlinear Finite Element Methods. Springer.

T.J.R. Hughes. The Finite Element Method: Linear Static and Dynamic Finite Element Analysis. Dover Publications.

Modalità verifica apprendimento

Homework evaluation + oral discussion

Altre informazioni

Obiettivi Agenda 2030 per lo sviluppo sostenibile

[Sbl legenda sviluppo sostenibile](#)