



# UNIVERSITÀ DI PAVIA

Anno Accademico 2018/2019

## NONLINEAR COMPUTATIONAL MECHANICS

<b>Anno immatricolazione</b>	2018/2019
<b>Anno offerta</b>	2018/2019
<b>Normativa</b>	DM270
<b>SSD</b>	ICAR/08 (SCIENZA DELLE COSTRUZIONI)
<b>Dipartimento</b>	DIPARTIMENTO DI INGEGNERIA INDUSTRIALE E DELL'INFORMAZIONE
<b>Corso di studio</b>	INDUSTRIAL AUTOMATION ENGINEERING - INGEGNERIA DELL'AUTOMAZIONE INDUSTRIALE
<b>Curriculum</b>	Robotics and Mechatronics
<b>Anno di corso</b>	1°
<b>Periodo didattico</b>	Secondo Semestre (06/03/2019 - 14/06/2019)
<b>Crediti</b>	6
<b>Ore</b>	51 ore di attività frontale
<b>Lingua insegnamento</b>	Italiano
<b>Tipo esame</b>	SCRITTO E ORALE CONGIUNTI
<b>Docente</b>	AURICCHIO FERDINANDO (titolare) - 2 CFU MORGANTI SIMONE - 2 CFU REALI ALESSANDRO - 2 CFU
<b>Prerequisiti</b>	A good knowledge of the basic concepts given within the courses of Mechanics of Solids and Structures, Numerical Analysis, and Computational Mechanics is required.
<b>Obiettivi formativi</b>	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.
<b>Programma e contenuti</b>	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](#)