



## NONLINEAR COMPUTATIONAL MECHANICS

Enrollment year	2016/2017
Academic year	2017/2018
Regulations	DM270
Academic discipline	ICAR/08 (CONSTRUCTION SCIENCE)
Department	DEPARTMENT OF ELECTRICAL, COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	Bioingegneria delle cellule e dei tessuti
Year of study	2°
Period	2nd semester (05/03/2018 - 15/06/2018)
ECTS	6
Lesson hours	50 lesson hours
Language	English
Activity type	WRITTEN AND ORAL TEST
Teacher	AURICCHIO FERDINANDO (titolare) - 3 ECTS REALI ALESSANDRO - 3 ECTS
Prerequisites	A good knowledge of the basic concepts given within the courses of Mechanics of Solids and Structures, Numerical Analysis, and Computational Mechanics is required.
Learning outcomes	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.
Course contents	Basics of nonlinear mechanics Kinematics Equilibrium Hyperelastic constitutive laws

	<p>Elements of numerical analysis</p> <p>Solution of nonlinear equations and systems</p> <p>Matlab implementation of basic algorithms</p> <p>Nonlinear finite elements</p> <p>Basic concepts</p> <p>Application to 1D rods at large strains (and Matlab implementation)</p> <p>Application to 2D plane strain problems at large strains (and Matlab implementation)</p> <p>Use of a commercial nonlinear finite element code</p>
<b>Teaching methods</b>	Blackboard lectures and Matlab-based hands-on tutorials.
<b>Reccomended or required readings</b>	<p>Suggested references are (among others):</p> <p>J. Bonet, R.D. Wood. Nonlinear Continuum Mechanics for Finite Element Analysis. Cambridge University Press.</p> <p>O.C. Zienkiewicz, R.L. Taylor, J.Z. Zhu. The Finite Element Method: Its Basis and Fundamentals. Elsevier.</p> <p>O.C. Zienkiewicz, R.L. Taylor, J.Z. Zhu. The Finite Element Method for Solid and Structural Mechanics. Elsevier.</p> <p>P. Wriggers. Nonlinear Finite Element Methods. Springer.</p> <p>T.J.R. Hughes. The Finite Element Method: Linear Static and Dynamic Finite Element Analysis. Dover Publications.</p>
<b>Assessment methods</b>	Homework evaluation + oral discussion
<b>Further information</b>	
<b>Sustainable development goals - Agenda 2030</b>	<a href="#">\$lbl legenda sviluppo sostenibile</a>