



Course unit English denomination	Constitutive modeling for hyperelastic and visco-hyperelastic materials
SS	IBIO-01/A (ex ING-IND/34)
Teachers in charge	Emanuele Luigi Carniel Chiara Giulia Fontanella Ilaria Toniolo
Teaching Hours	24
Number of ECTS credits allocated	4
Course period	Second semester
Course delivery method	☒ In presence ☐ Remotely ☐ Bended
Language of instruction	English
Mandatory attendance	☐ Yes (% minimum of presence) ☒ No
Course unit contents	- Formulation of the initial and boundary value in mechanics - Axiomatic theory of constitutive relationships - Hyperelastic constitutive formulations for isotropic and anisotropic materials - Visco-elastic and visco-hyperelastic constitutive formulations - Implementation of the constitutive formulations within finite element method environment - Planning, design and development of mechanical experimental tests for the univocal identification of the constitutive parameters - Procedures for the identification of the constitutive parameters on the basis of experimental data
Learning goals	The course aims to provide skills related to the modelling of the mechanical behaviour of soft materials. In particular, it aims to provide skills related to the theoretical foundations underlying the constitutive formulations, the experimental procedures necessary to obtain phenomenological data on the mechanical behaviour, the computational procedures for the identification of the constitutive



	parameters and the implementation in the framework of finite element software.
Teaching methods	Frontal teaching, experimental and computational laboratory
Course on transversal, interdisciplinary, transdisciplinary skills	☒ Yes ☐ No
Available for PhD students from other courses	☒ Yes ☐ No
Prerequisites (not mandatory)	Nonlinear mechanics of continuous media
Examination methods (in applicable)	- Constitutive analysis by means of experimental tests and mathematical formulation. Oral examination.
Suggested readings	- Holzapfel, Gerhard A., Nonlinear solid mechanicsa continuum approach for engineering /Gerhard A. Holzapfel. Chichester <etc.>: John Wiley and sons. - Y.C. Fung, Biomechanics - Mechanics of living tissues. --: Springer, 1993.
Additional information	-