UNIVERSITÀ DI PAVIA

Anno Accademico 2018/2019

COMPUTATIONAL MECHANICS

Anno immatricolazione	2018/2019
Anno offerta	2018/2019
Normativa	DM270
SSD	ICAR/08 (SCIENZA DELLE COSTRUZIONI)
Dipartimento	DIPARTIMENTO DI INGEGNERIA CIVILE E ARCHITETTURA
Corso di studio	CIVIL ENGINEERING FOR MITIGATION OF RISK FROM NATURAL HAZARDS
Curriculum	Reduction of seismic risk
Anno di corso	1°
Periodo didattico	Primo Semestre (24/09/2018 - 17/10/2018)
Crediti	6
Ore	51 ore di attività frontale
Lingua insegnamento	English
Tipo esame	SCRITTO E ORALE CONGIUNTI
Docente	REALI ALESSANDRO (titolare) - 5 CFU SCALET GIULIA - 1 CFU
Prerequisiti	Intermediate knowledge of algebra, mechanics of solids (basic concepts on strain and stress), numerical analysis.
Obiettivi formativi	The objective of the course is to introduce students to classical Computational Mechanics tools, and, in particular, to the most widely used one, namely, the finite element method. The main aim is building a deep knowledge of the basic ideas, the potential, and the limitations of the finite element method, both from the theoretical and the practical point of view, also through the development of simple codes for the simulation of frames and solid mechanics problems.
Programma e contenuti	Review of beam theory and of standard displacement-based methods for planar frames.

	Basic concepts of the finite element method and development of a finite element scheme for Bernoulli- Euler beams, starting from the elastica differential equation. Development of a finite element scheme for (shear-deformable) Timoshenko beams starting from the total potential energy. Shear locking issues and possible solution techniques. Review of linear elasticity. Finite elements for linear elasticity in 1D and 2D. Development of triangular and isoparametric quadrilateral finite elements. Numerical integration. Volumetric locking issues and possible solution techniques. Review of advanced Computational Mechanics methods.
Metodi didattici	Theoretical lectures at the blackboard will be complemented by tutorials aiming at the practical implementation in Matlab of the methods considered during the lectures.
Testi di riferimento	T.J.R. Hughes, “The Finite Element Method: Linear Static and Dynamic Finite Element Analysis. Dover, 2000.
Modalità verifica apprendimento	Assignments will be handed over and graded during the course. The final examination will consist of a written (closed-book) test. Grading: 40% assignments, 60% final exam.
Altre informazioni	---
Obiettivi Agenda 2030 per lo sviluppo sostenibile	Gli obiettivi