Anno Accademico 2016/2017

FINITE ELEMENT METHOD AND APPLICATIONS

Enrollment year	2016/2017
Academic year	2016/2017
Regulations	DM270
Academic discipline	MAT/08 (NUMERICAL ANALYSIS)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	Bioingegneria delle cellule e dei tessuti
Year of study	1°
Period	1st semester (26/09/2016 - 13/01/2017)
ECTS	3
Lesson hours	30 lesson hours
Language	ITALIAN
Activity type	WRITTEN AND ORAL TEST
Teacher	SANGALLI GIANCARLO - 3 ECTS
Prerequisites	Calculus for multivariate functions, vectors and matrices. Programming in MATLAB/Octave language
Learning outcomes	The aim of the course is divided in two parts. DYNAMICAL SYSTEMS: theory and numerical methods (6CFU) and FINITE ELEMENT METHOD AND APPLICATIONS (3CFU). The second part of the course will be devoted to the introduction of the variation formulation of the stationary problema and to their numerical approximation by the finite element method.
Course contents	FINITE ELEMENT METHOD AND APPLICATIONS Basic notions of functional analysis. Sobolev spaces. Variational formulation of elliptic problems (Poisson).

Ritz-Galerkin method
Mesh in one and more dimemsions -- Some finite elements -- Approximation properties -- Error estimates for elliptic problems of second order.

MATLAB solver implementation
Solution of the Poisson problem in one dimension. Solution of the Poisson problem in two dimension: assembling the linear system, numerical quadrature, system solving. Mesh refinement.

Teaching methods	METODO DEGLI ELEMENTI FINITI E APPLICAZIONI Lectures (hours/year in lecture theatre): 12 Practical class (hours/year in lecture theatre): 12 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	Quarteroni A.. Modellistica numerica per problemi differenziali. Springer Verlag, 2009. Braess D.. Finite Elements. Theory, Fast Solvers, and Applications in Solid Mechanics.. Cambridge University Press..
Assessment methods	Oral examination
Further information	Oral examination
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile