



### FINITE ELEMENT METHOD AND APPLICATIONS

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

	<p>Ritz-Galerkin method  Mesh in one and more dimensions -- Some finite elements --  Approximation properties -- Error estimates for elliptic problems of second order.</p> <p>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.</p>
<b>Teaching methods</b>	<p>METODO DEGLI ELEMENTI FINITI E APPLICAZIONI</p> <p>Lectures (hours/year in lecture theatre): 12  Practical class (hours/year in lecture theatre): 12  Practicals / Workshops (hours/year in lecture theatre): 0</p>
<b>Reccomended or required readings</b>	<p>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..</p>
<b>Assessment methods</b>	<p>Oral examination</p>
<b>Further information</b>	<p>Oral examination</p>
<b>Sustainable development goals - Agenda 2030</b>	<p><a href="#">\$lbl legenda sviluppo sostenibile</a></p>