DESCRIPTION OF THE EDUCATIONAL ACTIVITY

Academic year: *2010-2011*

Course title: *Computational Fluid Dynamics*

Course number:

Type of educational activity: *mandatory class*

Subject Group: *ING-IND/06*

Year of study: *2nd year "Laurea Specialistica"*

Semester: *1st*

Total number of credits: *9*

Global workload (n. of hours) : *225*

Number of hours allocated to: lectures, tutorials, laboratory, individual study: *54,36,0,135*

Name of lecturer: *Prof. Paolo Luchini, Dr. Flavio Giannetti*

Objectives of the course: *the aim of this course is to illustrate a broad range of multidimensional problems arising in fluid dynamics and to provide an overview of the computational methods used to solve them.*

Prerequisites: *Quadrature formulas, numerical solution of linear systems, numerical Fourier transform*

Course contents: *Numerical simulation of lumped parameter systems. Numerical solution of time and space dependent problems. Numerical solution of two and three dimensional spatial problems. Parabolic, ellittic and hyperbolic problems. Spectral techniques. Computation of boundary-layer flows. Low Reynolds number flows. Numerical solution of the incompressible Navier-Stokes equations. Conservation laws in compressible flow. Irrotational flow around aerodynamic bodies. Boundary element method.*

Recommended reading: *S. K. Godunov, V. S. Riabenki: Difference Schemes (Elsevier 1987), R. J. LeVeque: Finite Difference Methods for Ordinary and Partial Differential Equations (SIAM 2007) , M.Quadrio e P. Luchini: Aerodinamica. (Dispense Politecnico di Milano), Anderson : Computational Fluid Dynamics . (McGraw Hill, 1995), R. J. LeVeque: Numerical Methods for Conservation Laws. (Birkhauser, 1992)*

Teaching methods: *lectures, seminars, discussion of programs written by the student.*

Assessment methods: *oral examination*

Language of instruction: *Italian*

Additional information: *further information can be requested via e-mail: fgiannetti@unisa.it*