

Multivariate polynomial and non polynomial approximation

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Timetable: 16 hrs. Lectures on September-October 2012 (see the calendar), Room 2BC/30, Torre Archimede.

Course requirements: the Numerical Analysis (or Numerical Calculus) university course. Students should have a good background on univariate polynomial and non polynomial approximation (interpolation by polynomials, least-squares approximation, error estimation, basic numerical linear algebra).

Examination and grading: grading is based on the development of a short project on some complementary topics.

SSD: MAT/08 Numerical Analysis

Aim: after an introduction to the polynomial interpolation problem in the multivariate setting (existence and unicity), we shall face the problem of finding good interpolation points for polynomial interpolation problems. This will lead to the problem of the so-called *weakly admissible meshes*, *Padua points*, *approximate Fekete points* and *Discrete Leja points*. A brief introduction to *radial basis functions* approximation will be also provided.

Course contents:

1. The multivariate approximation problem. Lebesgue constants.
2. Near optimal interpolation points: Padua, Fekete and Leja points.
3. (Weakly) Admissible Meshes ((W)AMs): definition, properties and computations.
4. Applications: least squares approximation, quadrature.
5. (if time left) Radial Basis Functions: construction and applications.

For references, interested students are invited to refer to the web page of the **Constructive Approximation and its Applications** group, between the Universities of Padova and Verona, <http://www.math.unipd.it/~marcov/CAApubl.html>.