Meshless Approximation: Theory and Applications

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Timetable: 16 hrs. First lecture on January 9th, 2023, 14:00, (dates already fixed, see Calendar of Activities at https://dottorato.math.unipd.it/calendar), Torre Archimede, Room 2BC30.

Course requirements: Advanced Numerical Analysis, Real Analysis, Functional Analysis.

Examination and grading: final oral exam.

SSD: MAT/08

Aim: The objective of this course is to teach in a unified manner the fundamentals of the scattered data approximation methods. The course will emphasize the radial basis function approximations. Students will learn the key concepts of multivariate scattered data approximation with kernel-based methods and learn how to apply these methods to the solution of partial differential equations (PDEs) and applications to real world problems.

Course contents:

- An overview on multivariate approximation with Radial Basis Function (RBF)
- Reproducing kernel Hilbert spaces
- Error bounds in Sobolev norms
- Stability and trade-off principles
- Weighted Residual Methods
- RBF collocation method to solving some classical PDEs
- New applications of RBF approximation

Material: Lecture Notes provided by the teacher.