Approximation and complexity

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Timetable: 16 hrs. First lecture on January 10, 2019, 14:30 (dates already fixed, see calendar) Torre Archimede, Room 321 (NumLab) on 3rd floor.

Course requirements: basic knowledge of numerical analysis (polynomial interpolation, quadratures), and functional analysis (continuous linear operators, Banach spaces, Hahn-Banach theorem)

Examination and grading: based on student's activity and homeworks given during the course

SSD: MAT/08

Aim: The aim is to present rudiments of information-based complexity (IBC), which deals with computational complexity of problems for which available information is partial, noisy, and priced. Selected problems from approximation theory that are important for IBC will be discussed as well.

Course contents:

A. Topics in approximation theory

1. Optimal approximation by polynomials
2. Lethargy theorem
3. Theorems of Jackson and Bernstein

B. Information-based complexity

1. Optimality of linear algorithms
2. Adaption versus non-adaption
3. Worst case versus asymptotic setting
4. Complexity of function approximation