Modern Aspects of Constructive Function Theory

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Timetable: 16 hrs. Torre Archimede
Date: January 10, 11, 12, 13, 17, 18, 19, 20, 2017
Rooms and time: the lectures of Tuesday 10 and 17 are in room 2BC30, 10:30-12:00; the lectures of Friday 13 and 20 are in room 2BC30, 9:30-11:00.
The other lectures as usual room 2AB45, 11:30-13:00.

Course requirements: Attendance of lectures and successful final oral test

Examination and grading: oral exam at the end of course

SSD: MAT08, Subject: Approximation Theory

Aim: The main goal of the course is to introduce students to the main topics and methods of the Approximation Theory. The learning outcomes of the course: By the end of the course, students are enabled to do independent study and research in fields touching on the topics of the course, and how to use these methods to solve specific problems. In addition, they develop some special expertise in the topics covered, which they can use efficiently in other mathematical fields, and in applications, as well.

Course contents:

1. Stone-Weierstrass theorem, positive linear operators. Korovkin theorem.
2. Best approximation in various Banach spaces. Haar spaces and Chebyshev Theorem.
3. Classical polynomial inequalities (Bernstein, Markov, Remez inequalities).
4. Direct and converse theorems of best approximation (Favard and Jackson Theorems).
5. Approximation by linear operators (Fourier and Fejér operators, Bernstein Polynomials).
6. Lacunary polynomial approximation, incomplete polynomials, Müntz theorem.
7. Bernstein-Markov type inequalities for multivariate polynomials on convex and star like domains in uniform and integral norms.
8. Markov type inequalities for homogeneous polynomials on convex bodies.
9. Tangential Bernstein-Markov type inequalities.
10. Remez type inequalities for multivariate polynomials on star like domains and convex bodies and their application.
11. Admissible and optimal meshes for multivariate polynomials.
12. Some contemporary aspects of density for multivariate functions. Approximation by ridge functions and incomplete polynomials in several variables. Approximation by homogeneous polynomials on the boundary of convex domains. Approximation of convex bodies by convex algebraic level surfaces

Reference: R. DeVore and G. Lorentz, Constructive Approximation, Springer, 1991.