Suggested curriculum in Approximation Theory

Responsible: Prof. Wiesław Pleśniak

1st year

title	kind of activity	hours/ week	hours/ year	form of crediting	credits
General School Seminar	seminar	2	60	participation	**4**
Seminar	seminar	2	60	participation	**6**
Mathematical Analysis	lectures, classes	2 2	60 30	exam	**12**
Functions of One Complex Variable	lectures	2	30	exam	**5**
Functional Analysis	lectures	2	30	exam	**5**
Approximation Theory in Normed Spaces	lectures	2	30	exam	**5**
Chebyshev Approximation by Polynomials and Rational Functions	lectures	2	30	exam	**5**
Tutorials	tutorial	2	60	as arranged with tutor	**4**

2nd year

title	kind of activity	hours/ week	hours/ year	form of crediting	Credits
General School Seminar	seminar	2	60	participation	**4**
Seminar	seminar	2	60	participation	**6**
Minimal Projections in Banach Spaces	lectures	2	30	exam	**5**
Constructive Function Theory	lectures	2	30	exam	**5**
Tutorials	tutorial	2	60	as arranged with tutor	**6**
Diploma project	individual work	10	300	diploma exam	**30**

Approximation theory in normed spaces. Basic notions of approximation theory, proximinality, uniqueness of best approximation, geometric properties of normed spaces, Kolmogorov's type criteria, approximation in classical Banach spaces, algorithms for seeking best approximation.
Responsible: Prof. Grzegorz Lewicki

Minimal projections in Banach spaces. Projections and their basic properties, minimal projections and their connection with elements of best approximation, existence of minimal projections, characterization of one-complemented subspaces, estimates of norms of minimal projections, minimal projections in L^p spaces, unicity of minimal projections.
Responsible: Prof. Grzegorz Lewicki

Chebyshev approximation by polynomials and rational functions. The Weierstrass theorem, Bernstein polynomials, the Stone-Weierstrass theorem, the Műntz theorem, Haar conditions, Haar's theorem, alternation theorem, Chebyshev polynomials, linearly dense systems, Fourier operators, Fejér's theorem, Chebyshev approximation in the complex domain, Mergelyan's theorem, Runge's theorem, the Swiss cheese.
Responsible: Prof. Wiesław Pleśniak

Constructive function theory. Bernstein's "lethargy" theorem, the Jackson theorems, the inequalities of Markov and Bernstein, the Bernstein theorems on best polynomial approximation of infinitely differentiable and analytic functions, quasi-analytic functions in the sense of Bernstein and Denjoy-Carleman, the polynomial lemma of Leja, Lagrange extremal polynomials, Siciak's extremal function, polynomial inequalities in several variables, approximation and extension problems for infinitely differentiable functions of several variables.
Responsible: Prof. Wiesław Pleśniak

Seminar. Presentation of selected topics of Approximation Theory carried out in the Department seminar on Approximation Theory.

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Diploma project – the one year diploma project supervised by a professor.