Programa Análisis Funcional 1 (MATE-4330)

The main topics of the course are Banach and Hilbert spaces and linear operators between them. An important special case of a normed space is the dual space of a normed space.

Basic theorems, such as the Baire category theorem, the Hahn-Banach theorem, the Banach-Steinhaus theorem, the closed graph theorem and the open mapping theorem will be proved.

In many applications, the spectrum of a linear operator plays an important role. The spectral theorem for compact operators will be proved. If time permits, also the spectral theorem for selfadjoint linear operators will be proved.

There are many good books on functional analysis. For the preparation of this course, I will use mainly

J. Lesmes. *Análisis funcional.*

J. Weidmann. *Linear operators in Hilbert spaces*, volume 68 of *Graduate Texts in Mathematics.* Springer-Verlag, New York, 1980.

Additional literature:

N. Dunford and J. T. Schwartz. *Linear operators. Part I.* Wiley Classics Library. John Wiley & Sons Inc., New York, 1988.

T. Kato. *Perturbation theory for linear operators.* Classics in Mathematics. Springer-Verlag, Berlin, 1995. Reprint of the 1980 edition.

M. Reed and B. Simon. *Methods of modern mathematical physics. I.* Academic Press Inc. [Harcourt Brace Jovanovich Publishers], New York, second edition, 1980.

W. Rudin. *Functional analysis.* International Series in Pure and Applied Mathematics. McGraw-Hill Inc., New York, second edition, 1991.

Evaluation

25%	partial exam
25%	final exam
25%	homework I, including presentation of problems on the blackboard
25%	homework II, including presentation of problems on the blackboard

A necessary criterion to pass the course is to achieve at least 50% in the exams.