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Lecture summer semester 2020

Functional analysis II - Spectral theory in Hilbert spaces

In your linear algebra course you have learned that every hermitian matrix admits a basis of orthogonal eigenvectors associated with real-valued eigenvalues. In our course we focus on generalizations in the framework of self-adjoint operators on Hilbert spaces. Starting out with compact operators we'll work towards our main goal, which is the spectral theorem for unbounded self-adjoint operators and some impactful mathematical applications.

Target group: Diploma and master students. Students enrolled in the master program "Mathematical Physics" may get credit for the module 10-MAT-MPFOP2 if they successfully give a talk in a related seminar within the master program. Students who would like to do that should contact me in advance.

Prerequisites: pre-diploma in mathematics, basic measure theory, basic knowledge of functional analysis, in particular on normed spaces, Hilbert spaces and bounded operators. And most importantly of course, having fun learning new maths! ;)

Note: this course will be held in **English**.

Coordinates if and when classes resume:
Mon 13:15-14:45 and Tue 11:15-12:45 in SG 2-14

Until we can meet again in person you will be provided with learning material that is designed for self-study and will serve as a basis for your communication with your fellow participants and with the instructor. Please reserve the above time slots for virtual interactions. You are in? Great, just sign up for the moodle course! If you have any questions, send me an email.

Literatur

[1] John B.Conway. *A Course in Functional Analysis*. GTM, Springer-Verlag.

[2] Peter Lax. *Functional Analysis*. Wiley.

[3] Gert K. Pedersen. *Analysis Now*. GTM, Springer-Verlag.

[4] Michael Reed and Barry Simon. *Methods of Modern Mathematical Physics I, II and IV*. Academic Press New York and London.

[5] Konrad Schmüdgen. *Unbounded Self-adjoint Operators on Hilbert Space*, GTM Springer-Verlag.

[6] Joachim Weidmann. *Lineare Operatoren in Hilberträumen I: Grundlagen* (for German speakers). B.G.Teubner Stuttgart Leipzig Wiesbaden.

[7] Dirk Werner. *Funktionalanalysis* (for German). Springer-Verlag.