

## WINTER SEMESTER 2015/16 - SEMIGROUPS OF LINEAR OPERATORS

**Text.** Igor Chueshov: Lectures on operator semigroups (Lecture notes 2015) available via <http://mathphys.univer.kharkov.ua/eng/staff/chueshov>

**Seminar.** Monday 11 am - 1 pm, RUD 25, room 4.007

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**Secretary.** Sabine Schmidt, room 2.103, (030) 2093 1820

**Office hours.** Tuesday 2 - 3 pm

**Contents.** Semigroups of linear operators allow for an efficient treatment of time-dependent partial differential equations, such as the heat equation, the Schrödinger equation, and the wave equation. Using linear operators, many partial differential equations can be expressed as ordinary differential equations for functions with values in a Hilbert or Banach space.

Qualitative properties of solutions such as stability can be assessed. Furthermore, the method of semigroup can be extended to certain non-linear equations.

**Prerequisites.** Higher Analysis I (Functional analysis), Higher Analysis II (Linear Partial Differential Equations).

**Seminar talks.** Starting on October 19, every participant will give a 70 minute lecture. If we have more than 15 participants the duration of some talks will be shorter. If there are fewer than 15 participants you may be asked to give two talks.

date	topic	speaker
10/19	Strongly continuous semigroups	
10/26	Uniformly continuous semigroups	
11/2	Semigroup generators	
11/9	The Hille-Yoshida Theorem	
11/16	The Lumer-Phillips Theorem	
11/23	Some generation results in Hilbert spaces	
11/30	Notions of stability and strong stability	
12/7	Uniform Stability	
12/14	Analytic semigroups	
1/4	Linear equations: homogeneous equations	
1/11.	Linear inhomogeneous equations	
1/18	Second-order evolution equations	
1/25	Damping	
2/1	The simplest nonlinear equation	
2/8	Conclusion	