



Finnish Centre of Excellence in Inverse Problems Research  
Invited Lectures, June 2–3, 2010, Oulu, Finland

## Introduction to diffusion equations with singular coefficients

prof. El Maati Ouhabaz

Université Bordeaux 1  
Institut de Mathématiques de Bordeaux  
351, cours de la Libération  
F-33405 Talence cedex  
Elmaati.Ouhabaz at math.u-bordeaux1.fr  
<http://www.math.u-bordeaux1.fr/~ouhabaz/>

### Abstract

In these lectures we introduce the necessary material to study evolution equations associated with second order differential operators. The most elegant way to show existence and uniqueness of the solution in an  $L^2$ - setting consists in constructing the operator by the sesquilinear form method. This method allows to treat operators with non-smooth coefficients as well as operators on domains which are subject to boundary conditions like Dirichlet or Neumann conditions. We also discuss the  $L^p$ -setting as well as recent developments on heat kernel estimates.

### Timetable

The lectures take place in room M101 at the Department of Mathematical Sciences, University of Oulu. The detailed timetable is as follows:

	Wednesday, Jun 2	Thursday, Jun 3
11–12	Lecture 1	Lecture 3
12–13	<i>Lunch</i>	<i>Lunch</i>
13–14	Lecture 2	Lecture 4

### References

- [1] E. B. Davies. *Heat Kernels and Spectral Theory*, Cambridge University Press, Cambridge, 1989.
- [2] T. Kato. *Perturbation Theory for Linear Operators*, Springer, Berlin, 1995.
- [3] E. M. Ouhabaz. *Analysis of Heat Equations on Domains*, Princeton University Press, Princeton, 2005.