PREFACE

The aim of these lecture notes is to present some basic facts and ideas of the theory of Gaussian measures on infinite dimensional Hilbert spaces and to show to the reader how this theory can be applied to solve the infinite dimensional heat equation and, more generally, its perturbations by a linear drift term.

In particular, the Cameron-Martin theorem will be useful to obtain regularity properties of the semigroup generated by the Gross-Laplacian and the Ornstein-Uhlenbeck semigroup.

These notes originated from a course given by the second author at the University of Lecce in May 2002 and at the University of Halle-Wittenberg in May 2003.

We have organized these notes as follows.

In Chapter I we present a self consistent and relatively complete introduction to the theory of Gaussian measures on separable Hilbert spaces.

Gaussian measures and the Cameron-Martin theorem are used, in Chapter II, to study the infinite dimensional heat equation. Regularity results and the spectrum of the solution semigroup are also obtained.

Chapter III is concerned with the Ornstein-Uhlenbeck semigroup, first on the space of bounded continuous functions, and second on L^p–spaces with invariant measure. Regularity results and characterization of the domain of the generator are also obtained.

In the appendix we recall in the first part the classical Bochner theorem in $\mathbb{R}^N$ including, for the sake of completeness, a proof. In the second part we recall some basic and useful results of the theory of C_0-semigroups on Banach spaces.

Università di Lecce, whose interest and friendly support were very important. The third chapter is based on lectures given at the University of Halle-Wittenberg. The second author thanks J. Prüss and R. Schnaubelt for their warm hospitality and the Alexander von Humboldt foundation for the financial support.

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Lecce and Tübingen, July 2003

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