Programme 2016

TIME AND PLACE
26 May, 10:00–13:00, Lundmarksalen lecture hall, Astronomihuset, Sölvegatan 27.

10:00
Opening address by Olov Sterner, Dean of the Faculty of Science.

10:10
Head of department Gudrun Gudmundsdottir, Centre for Mathematical sciences, will introduce Professor Gerd Grubb – the Honorary Doctorate of Philosophy. Professor Gerd Grubb will then give the seminar entitled “Differential operators and Fourier methods”.

11:00
Professor emeritus Björn E. Berglund, Department of Geology, will introduce scientific illustrator Nils Forshed – the Honorary Doctorate of Philosophy. Nils Forshed will then give the seminar entitled “Illustrating facts of science and culture in an educational and enjoyable way”. The seminar will be held in Swedish.

11:50
Closing of seminar session by Olov Sterner.

12.00
Lunch and mingle outside Lundmarksalen lecture hall.
Meet the 2016 Honorary Doctors

GERD GRUBB
Seminar title
Differential operators and Fourier methods

Abstract
Mathematics often deals with solving equations. A particular type is differential equations: Find a function f that fulfills an equation combining f and its derivatives. This describes many physical phenomena, for example: Which curve does a ball follow? How does the temperature develop in a container, starting from a given value? How does air move around airplane wings? How do sound waves progress? Also the theory of Finance has differential equations, for example describing how the value of stock market options most likely will evolve. To solve these problems, one introduces differential operators that actively transform the function we seek to the combination of derivatives we have data on. For example, the Laplace operator, which sends a function of several variables over into the sum of its second derivatives with respect to each variable. Combinations of the Laplace operator with time-derivatives are also important, such as the heat operator, and the wave operator, entering in the above examples.

I shall try to describe an important development that took place in the second half of the last century. The Fourier transformation is an integral operator that turns differential operators into simpler multiplication operators. Based on this idea, new unified theories were created (partly by Lund mathematicians), introducing pseudodifferential operators and Fourier Integral Operators. They were used to answer increasingly complicated questions, in particular for linear problems (additive problems). For nonlinear problems, other methods were often involved rather than Fourier methods; the results there are more scattered and diverse.

Recently there has been an upsurge of interest in nonlocal problems, where the Laplace operator is replaced by its square root or other fractional powers of it, called fractional Laplacians. In the finance question, this apparently gives better predictions. The fractional Laplacian was here first treated as an integral operator. But it is in fact also a pseudodifferential operator, and we have improved the new results by taking pseudodifferential methods into the picture again.

NILS FORSHED
Seminar title
Illustrating facts of science and culture in an educational and enjoyable way

The seminar will be held in Swedish.

Abstract
My training as a forest officer and experiences from the Royal College of Forestry, combined with a great interest in nature, especially birds, insects and plants, as well as my desire to express myself through images, have resulted in my spending almost 50 years on illustrating scientific facts and theories from the most diverse areas in biology and geoscience in an educational, enjoyable and appealing way. I did this in close collaboration with researchers, nature writers and teaching staff often related to environmental organisations, universities or government authorities. I have participated as an illustrator of several handbooks on environmental protection published by the Swedish Environmental Protection Agency and encyclopedias such as the National Atlas of Sweden. I have been particularly interested in the dynamics of the natural and cultural landscape as a result of changes in agriculture and forestry, flora and fauna. Through images, I have tried to describe the process from a historical perspective – the thousand years since the immigration of plants and animals after the Ice Age, or just the development of the agrarian landscape. I have participated on several occasions as an illustrator for research projects linked to Lund University within geology, ecology, human geography and archaeology, such as an interdisciplinary project on the cultural landscape over 6 000 years in southern Sweden, and one on the development of the Swedish landscape over 11 000 years.