

# Short Scientific Report

The 2020 CIMPA Research School on Functional Analysis and Applications organized by the School of Mathematics of the University of the Witwatersrand was held from 13 January 2020 to 24 January 2020 at New Commerce Building 1 and 2 (NCB1 and NCB2) at the West Campus of the University of the Witwatersrand.

We had three lecturers from overseas. They are Professor Isabelle Chalendar from the University of Paris - Est Marne - la Vallée who is the Scientific Coordinator, Professor Pascal Lefevre of the University d'Artois and Wolfgang Arendt University of Ulm and Editor in Chief of Journal Evolution Equations. Professor Sandra Pott of Lund University had withdrawn from the teaching for family reasons and had been replaced by Professor Sanne ter Horst of North University, South Africa. We had as well Professor Manfred Moller and Professor Bruce A. Watson of the University of the Witwatersrand. Various topics in Functional Analysis had been taught during the school.

Next is the list of lectures and talks given with the names of lecturers

- 1) Linear semigroups by Wolfgang Arendt
- 2) Finite dimensional asymptotics by Wolfgang Arendt
- 3) Strong convergence and selfadjoint operators by Wolfgang Arendt
- 4) Spectral decomposition by Wolfgang Arendt
- 5) Galerkin Approximation (Seminar) by Wolfgang Arendt
- 6) Hardy-Hilbert space by Isabelle Chalendar
- 7) Beurling Theorem by Isabelle Chalendar
- 8) Linear and bounded operators on Hardy-Hilbert space by Isabelle Chalendar
- 9) Truncated Toeplitz operators and composition operators on Hardy – Hilbert spaces by Isabelle Chalendar
- 10) Some useful results in function theory and introduction to Hardy spaces

by Pascal Lefevre

- 11) Composition operators by Pascal Lefevre
- 12) Carleson embedding and examples of symbols by Pascal Lefevre
- 13) Compact composition operators by Pascal Lefevre
- 14) Volterra and Cesaro mean operators on  $L_p$  spaces (Seminar) by Pascal Lefevre
- 15) Introduction to Spectral Theory by Manfred Möller
- 16) Selfadjoint differential operators by Manfred Möller
- 17) Selfadjoint quadratic operator pencils by Manfred Möller
- 18) Fredholm valued (differential) operators by Manfred Möller
- 19) Expansion Theorem by Manfred Möller
- 20) Minimal systems of linear operator pencils by Manfred Möller
- 21) Review of discrete-time systems theory by Sanne ter Horst
- 22) Dissipative systems and robust control by Sanne ter Horst
- 23) Multidimensional linear systems by Sanne ter Horst
- 24) Robust control for multidimensional linear systems by Sanne ter Horst
- 25) Stochastic processes in Riesz spaces by Bruce Watson
- 26) An introduction to ordinary linear differential operators by Manfred Moller
- 27) Multidimensional systems and robust control by Sanne ter Horst
- 28) Riesz spaces by Bruce Watson
- 29) Conditional expectation operators in Riesz spaces by Bruce Watson
- 30) Universal completion with respect to a conditional expectation in Riesz spaces by Bruce Watson
- 31) Submartingale convergence and maximal inequalities in Riesz spaces by Bruce Watson
- 32) Stochastic processes in Riesz spaces (seminar) by Bruce Watson