

The Research Group Topological Algebra, Functional Analysis and Category Theory

has the honor to invite you to the public defense of the joint PhD thesis of

Jacques MASURET

to obtain the degree of Doctor of Sciences (VUB) and

PhD in Mathematics (University of Stellenbosch)

Title of the PhD thesis:

Generalised Sequences and Compactness Notions in Point-free Topology

Promotors: Prof. Dr. Mark Sioen (VUB) Prof. Dr. David Holgate (Stellenbosch Univ.)

The defense will take place on

Friday 8 September 2017 at 15:00h

in Auditorium D.2.01 at the Campus Humanities, Sciences and Engineering of the Vrije Universiteit Brussel, Pleinlaan 2 - 1050 Elsene, and will be followed by a reception.

Members of the jury:

Prof. Dr. Eva Colebunders (chairman) Prof. Dr. Gert Sonck (secretary) Dr. Bruce Bartlett (co-promotor, Stellenbosch Univ.) Prof. Dr. Stephan Wagner (Stellenbosch Univ.) Dr. Garret Boxall (Stellenbosch Univ.) Prof. Dr. Ales Pultr (Charles Univ., Czech Rep.)

Prof. Dr. Inderasan Naidoo (UNISA, South Africa)

Curriculum vitae

Jacques Masuret was born in 1984 in Paarl, South Africa, and attended school at Paarl Boys' High. He graduated as a Master of Science in Mathematics from Stellenbosch University (SU) in 2010. In 2011 he registered for a joint-PhD degree between SU and VUB. As part of his doctoral studies he completed two 3month research visits to VUB with the support of two research grants from the Oppenheimer Memorial Trust. He is currently employed as a part-time lecturer at SU.

Abstract of the PhD research

Topology is the branch of mathematics that studies properties of objects which are preserved under continuous transformation. To study such notions of continuity in classical (pointed) topology one equips a set of points with a structure of open subsets allowing one to express, among other notions, whether a point is near to a given subset or not.

In the 1950's the *Ehresmann Seminar* initiated the study of topological phenomena solely using the algebraic, order theoretic structure of the open sets, thus omitting any reference to the points. This has matured into the field of point-free topology which not only expands the scope of classical topology but also provides deeper topological insights, for instance into the use of choice principles.

While sequences and naturally associated notions like convergence and clustering have received extensive attention in classical topology, the same cannot be said for the point-free setting. The aim of this dissertation is to introduce sequences and related sequential notions in frames and to establish the extent to which point-free sequences can characterise countable compactness notions.

Furthermore, we will introduce the point-free Dini Property and Strong Dini Property and employ these properties to characterise weaker compactness notions. We also characterise those completely regular frames satisfying the Stone-Weierstrass property.