Dirk Basson

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Education

Doctoral Dissertation

Title	**On the Coefficients of Drinfeld Modular Forms of Higher Rank**, *Stellenbosch University*, April 2014.
Supervisor	Professor Florian Breuer
Description	The higher rank theory of Drinfeld modular forms is a very new area of function field arithmetic. In this dissertation I gave some initial steps toward understanding the coefficients of these modular forms and the Hecke operators that act on them.

Masters Thesis (cum laude)

Title	**Parametrizing Cyclic Automorphisms of Power Series Rings**, *Stellenbosch University*, December 2010.
Supervisor	Professor Barry Green
Description	In this thesis I studied the problem of lifting an order $q = p^r$ automorphism of a power series ring over a field of characteristic p to an order q automorphism of a power series ring over a field of characteristic 0. I surveyed what was known about this problem, and gave a few ways in which the problem may be simplified e.g. by looking at conjugates of such automorphisms.

Prior Eduction

2008	**Honours Bachelor of Science (cum laude)**, *Stellenbosch University*.
2005–2007	**Bachelor in Science (cum laude)**, *Stellenbosch University*.

Experience

Positions Held

2015	**Claude Leon Post-Doctoral Fellow**, *Stellenbosch University*.
2014	**Post-Doctoral Researcher**, *Leiden University*, Leiden, Netherlands.

This is mainly a research position, and thus I spent most of my time doing further research in the direction of my thesis, and attending advanced courses and seminars which are more common in the Netherlands than in South Africa. However, I am also doing some teaching, discussed in the next section.

Teaching

2014	**Lecturer**, *Leiden University*, Representation Theory of Finite Groups (Masters level).

My responsibilities were to develop a course curriculum, teach the material, and evaluate the students by means of homework sessions and an exam. This course was attended by about 25 students.

2011 **Temporary Lecturer**, *Stellenbosch University*, Mathematics 114 (First Calculus Course).

Job responsibilities included preparing for and presenting lectures to first year mathematics students, setting and grading test papers for Mathematics 114, and assisting individual students who needed additional tutoring.

2006–2012 **Tutorial assistant**, *Stellenbosch University*, Mathematics 114 (Calculus), Mathematics 244 (Analysis and Linear Algebra II), Engineering Mathematics 145 (Further Differential and Integral Calculus), Engineering Mathematics 242 (Series, Partial Differential Equations and Fourier Transform).

As a tutorial assistant, I facilitated tutorial sessions for a large groups of students. During the tutorials I assisted students on a one-on-one basis with complicated aspects of the curriculum.

Mathematical Olympiads

2012–2014 **Committee Member**, *SAMO 3rd Round*.

As a part of this committee my responsibilities are to design problems for the third round of the national Olympiad, to set the paper with the other members, and to mark the papers submitted by the students.

2008–2014 **Instructor**, *South African IMO training program*.

Instructing the National Mathematical Olympiad team involved simplifying advanced mathematical concepts for high school learners, all with different backgrounds and on different competency levels. It also involved setting and grading test papers and scheduling classes. As part of the team of instructors, I helped to determine what content to cover with the students. At our training camps I also had some administrative responsibilities.

2014 **Team Leader**, *South African IMO team*.

2013 **Deputy Leader**, *South African IMO team*.

2010, 2012 **Team Leader**, *South African Pan-African Mathematics Olympiad team*.

As Team Leader and Deputy Leader, I was part of the Olympiad Jury, who select the paper that is written, and I was responsible for marking our contestants' solutions and present them to the coordinators.

Other

2013 **Volunteer teacher**, *Deloitte Siyakhula Project*.

As a volunteer for the Deloitte & Touche Siyakhula Project, I prepared for and presented classes from the high school mathematics curriculum for students from previously disadvantaged communities.

Research

Research Interests

Number Theory and Arithmetic Geometry, more specifically Drinfeld modules and Drinfeld modular forms

Conference Participation: Talks given

2015 Number Theory Conference, AIMS, Muizenberg: *Rationality of Drinfeld modular forms of higher rank*

2014 Workshop on Function Field Arithmetic, Sirince, Turkey: *Drinfeld modular forms of higher rank and their coefficients*

2012 SAMS National Congress, Stellenbosch: *Lattices and Hecke operators*

2011	Arithmetic Algebraic Geometry Conference, Stellenbosch: *The moduli space of order q automorphisms of power series rings*

Conference Participation: Attendance

2013	Arithmetic Algebraic Geometry Conference, Stellenbosch
2012	Penn State - Göttingen Number Theory Conference, Göttingen, Germany
2012	Summer School Around the Zilber-Pink conjectures, Institut de mathématiques de Jussieu, Paris, France
2011	SAMS National Congress, Port Elizabeth
2011	XXII-ème Rencontres Arithmétiques de Caen, Caen, France
2009	Arithmetic Algebraic Geometry Conference, Stellenbosch

Research visits

2012	Prof. Lenny Taelman, Leiden University
2014	Prof. Gebhard Böckle, Heidelberg University

Other talks

February 2014	Leiden University Algebra Seminar: *Coefficients of Drinfeld modular forms of higher rank*
May 2014	Heidelberg University Algebra/Number Theory Seminar: *Fourier expansion of higher rank Drinfeld-Eisenstein series*

Publications

In preparation	Analytic Drinfeld modular forms of higher rank (with Breuer and Pink)
In preparation	Hecke operators for Drinfeld modular forms of higher rank

Awards

As university student

2012	Best presentation by a PhD student at the annual SAMS Congress
2009–2013	Wilhelm Frank Scholarship
2009	Vice-Chancellor's Award for Academic Excellence
2008–2013	Postgraduate Merit Bursary from Stellenbosch University
2006–2007	Undergraduate Merit Bursary from Stellenbosch University

Mathematics Olympiads

2001-2004	International Mathematics Olympiad: 2 Bronze Medals, 2 Silver Medals
2003	Winner of the South African Mathematics Olympiad

Special Skills

Languages

Afrikaans	**Mothertongue**	*Fluent in reading, writing and conversation*
English	**Bilingual**	*Fluent in reading, writing and conversation*
Dutch	**Intermediate**	*Comfortable in reading and writing and, with a little effort, conversation*

Attributes and Skills

- Hard working
- Analytical
- Fast Learner
- Effective at imparting knowledge
- Works well in teams
- Problem solver
- Gets along well with others
- Adaptable

References

I prefer to give my references' details only on request.