

About Us

This is the annual report of the African Institute for Mathematical Sciences (AIMS) for the period 1 August 2010 to 31 July 2011. It includes an overview of all activities of AIMS and its associated projects, as well as the financial statements for the 2010 calendar year.

AIMS is a partnership project between the following local and international universities:

University of Cape Town Stellenbosch University University of the Western Cape University of Cambridge University of Oxford Université of Paris Sud

The first group of students began their studies at AIMS in August 2003 and the 55 students who graduated in 2011 brought the total number of graduates to 360 students.

The goals of AIMS are:

- · To promote mathematics and science in Africa
- To recruit and train talented students and teachers
- To build capacity for African initiatives in education, research and technology.

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Eric Maulave - lecturer photographs • Anton Jordaan - graduation photographs • Damien Schumann Photography RevPrint Tokai - Design & Printing

FOREWORD BY THE DIRECTOR

During the 2010/2011 academic year the first concrete steps were taken to build a pan-African network of AIMS Centres. A special three-day meeting was held at AIMS in Muizenberg bringing all role-players together in October. This included members of the AIMS-Next Einstein Initiative (AIMS-NEI) Board, representatives from the countries where centres are planned to be opened in the near future and members of the Canadian International Development Research Centre (IDRC), who manage a very substantial grant awarded to AIMS-NEI by the Canadian Government. At this meeting the business plan was finalised and the AIMS-NEI Secretariat role defined alongside those of the AIMS Centres.

The first new AIMS Centre will open in Senegal in September 2011, followed by AIMS-Ghana: major achievements the South African AIMS Centre is proud to be part of.

These new centres will be established following the model of AIMS-South Africa in Muizenberg, which highlights the success, recognition and confidence many people, organisations and governments have expressed in the approach we follow and the achievements of the outstanding young Africans who are our students and alumni. The contribution AIMS has made to the South African mathematical sciences landscape has also been recognised and acknowledged, and at the Annual Congress of the South African Mathematical Society in November 2010, Neil Turok (Founder) and Fritz Hahne (founding Director) jointly received the 2010 Society Award for the Advancement of Mathematics. Quoting from the citation on the gala evening of the award, "Your contribution has been fundamental in building up the AIMS project and this has rejuvenated the mathematical sciences at a national level, and serves as a model to be emulated." We are all proud of this recognition, noting that a significant number of Master's and PhD students attending were former AIMS students. It is a pleasure to report on these activities in this 2010/2011 annual report.

Another very significant event was the international review of AIMS and its Research Centre in March this year. This review was commissioned by the AIMS Council and the South African National Research Foundation, the latter of which manages the grant we receive from the Department of Science and Technology. We recently received an excellent report following a comprehensive self-evaluation and three-day onsite visit by an independent international review panel.

Strong South African and international involvement is essential for the continued success of AIMS and it has been decided to open a second stream of our successful Postgraduate Diploma (PGD) Programme in January 2012, so as to be more attractive to South African students following the usual academic calendar.



It is intended that this intake will include a small group of prospective mathematics and science teachers, an area of dire need in South Africa. We have received strong support for this from our Advisory Board, Executive Team and others keen to see AIMS play a greater role in South Africa.

This year we have been pleased to sign two partnership agreements. The first agreement, between AIMS and the University of Fort Hare relates to the work of our Schools Enrichment Centre (AIMSSEC) which contributes significantly to the professional development of teachers. For this work we are in partnership with Stellenbosch University and now, following the signing of a memorandum of agreement also with the University of Fort Hare. The second agreement was signed with the South African Council for Scientific and Industrial Research (CSIR). Over the years a fruitful relationship has developed between AIMS and the CSIR and the agreement has formalised this cooperation more strongly.

Finally, it is a pleasure to report that we have been designated as a Centre of Excellence for postdoctoral research opportunities in the Mathematical Sciences for PhD graduates supported by the German DAAD.

I would like to thank our staff, lecturers, researchers, Council, special committees and donors, all of whom have contributed to the success of AIMS this year.

Barry Green Director

ACADEMIC PROGRAMMES

Postgraduate Diploma in Mathematical Sciences

The Postgraduate Diploma in Mathematical Sciences is AIMS' flagship programme which continues to attract hundreds of applications from all over Africa each year. 54 students from 21 countries were selected for the programme during the 2010 academic year and all 54 successfully completed the Diploma in June 2011.

The Diploma is accredited by the three local participating universities and students are divided between these universities for purposes of registration. The delivery of the programme is funded by the South African Department of Higher Education and Training.

The Diploma consists of three phases. The skills courses focus on upgrading the students' problem-solving and computational skills, while providing an introduction to computer programming and scientific writing in English; the review courses introduce the students to cutting edge topics in the mathematical sciences; and in the third and final phase, each student writes an essay on a topic proposed by local academics.

Students are all required to present their research to a panel of external examiners. This year's panel included: Professor Gerhard Geldenhuys, Professor Fritz Hahne, Professor Mamadou Sango, Professor Christopher Gilmour, Professor Tertius de Wet, and Professor David Sherwell.

Skills Courses

Period	Lecturers	Course Title
23 Aug - 29 Oct	Jan Groenewald, AIMS	Introduction to AIMS computing facilities, LaTeX
3 Aug - 29 Oct	Frances Aron, AIMS	English Essentials, Communications Skills
10 Aug -17 Sept	Alan Beardon, Cambridge; Stephan Wagner, Stellenbosch	Mathematical Problem Solving
0 Aug -17 Sept	Jesus Cerquides, Barcelona	Software Development using Python and SciPy
0 Sept - 8 Oct	Alan Beardon, Cambridge	Geometry and Group Theory
0 Sept - 8 Oct	Dirk Laurie, Stellenbosch	Experimental Mathematics with SAGE
11 Oct - 29 Oct	David Aschman & Roger Fearick, Cape Town	Physical Problem Solving
1 Oct - 29 Oct	Rob Beezer, Puget Sound	Applied Linear Algebra with SAGE

Review Courses

Period	Lecturers	Course Title
8 Nov - 26 Nov	Robert de Mello Koch, Witwatersrand	Electromagnetism
	Peter Ouwehand, Stellenbosch	Probability, Martingales and Finance
	Bernd Schroers, Heriot-Watt	Ordinary Differential Equations
29 Nov - 17 Dec	Florian Breuer & Stephan Wagner, Stellenbosch	Introduction to Number Theory
	Peter Clarkson, Kent & Kesh Govinder, KwaZulu-Natal	Nonlinear Waves
	Henry Mwambi, KwaZulu-Natal	Introduction to Statistical Modelling
3 Jan - 21 Jan	Jean Francois Joanny, Pierre et Marie Curie, Paris VI	Statistical Physics for Soft Matter and Biophysics
	Jeff Sanders, UNUIST	Designing Algorithms
	Tadashi Tokieda, Cambridge	Topology and Geometry
24 Jan - 11 Feb	Jan Govaerts, Louvain	Introduction to Quantum Physics & Relativistic Quantum Field Theor
	Jeff Murugan, Cape Town	Applied Complex Analysis
	Stephane Ouvry, Paris Sud XI	Statistical Mechanics
21 Feb - 11 Mar	Patrick Dorey, Durham	Solitons
	Gerhard Pfister, Kaiserslautern	Computer Algebra and Applications
	Douw Steyn, British Columbia	Mathematical Modelling of Natural Systems
14 Mar - 1 April	Bharat Biswal & Paul Taylor, New Jersey	Biomedical Signal Processing
	Kevin Colville, CHPC	Concurrent Scientific Computing
	Johan de Villiers, Stellenbosch	Wavelets and Subdivision







PGD lecturer- Professor Alan Beardon

Professor Alan Beardon studied at London University and Harvard University, and obtained his PhD from Imperial College, London in 1964. He taught at the University of Maryland (USA) and the University of Kent (UK) before moving to the University of Cambridge in 1968.

He is the author of seven mathematical texts (one translated into Russian and Chinese) and more than 150 research papers. Professor Beardon is interested in most branches of mathematics, and has published papers in group theory, geometry, dynamical systems, measure theory, complex analysis and mathematical economics.

He is an AIMS Associate Faculty member, and has given a highly interactive course on Mathematical Problem

Solving in the Postgraduate Diploma Programme in every year that AIMS has existed. Alan also spends about six months every year in the AIMS Research Centre where he has conducted workshops with researchers and given seminars.

He is the Managing Editor of the AIMS Library Series which publishes mathematical books designed to inspire and inform readers, rather than present the material in a standard way (see page 14).

"I am committed to the informal and interactive teaching at AIMS, in which the professors mix with the students as colleagues. I have seen AIMS grow during the eight years since it opened its doors to students, and I am convinced that it will continue to grow successfully in the future to the benefit of many able African students."

Mebratu Fenta

Mebratu Fenta graduated from AIMS in 2011. Just before graduation he received an offer to further his study at PhD level at the University of Cape Town under the supervision of Professor Daya Reddy who is the Director of CERICAM, and a member of the AIMS Council.

"AIMS played a vital role in helping me get this opportunity. The training I got from AIMS was multidisciplinary: the skills courses are vital for modern science and technology and the interdisciplinary review courses in Mathematics, Applied Mathematics, Statistics, Computer Science and Physics made it possible for me to further my studies at PhD level."

Mebratu, who is from Ethiopia, is currently teaching Applied Mathematics courses for undergraduate students at Bahir Dar University until he starts his PhD in January 2012.

He is also informing his colleagues and students about the possibilities at AIMS, especially those whom he believes have the potential and interest to further their studies. "Most importantly, I am giving workshops on LATEX and Computing Using Sage, and Mathematical Modelling - knowledge which I gained at AIMS."

Savannah Nuwagaba

Savannah Nuwagaba from Uganda completed the AIMS Diploma in June 2011. She is currently pursuing her Master's degree in Biomathematics at the University of Stellenbosch. Her desire to join AIMS was triggered by the research opportunities which are opened up for AIMS students.

"When I was offered the bursary and started my studies there, all my expectations were met - and more. The learning environment where students interact with their lecturers, who are so committed to sharing their

knowledge, is one of those experiences that made me dream of going back home to share the knowledge I have acquired, in a similar manner."

She describes AIMS as "the tower on which one can stand to see the beauty and potential in Africa". She believes that the establishment of similar institutes will greatly impact the development of science in Africa. As she continues to pursue her career, she hopes that more women engage in science for the betterment of "our motherland, AFRICA."

Essay Phase

During the third semester, students write an essay on a topic which they select from a list proposed by local academics. This essay phase provides an introduction to the research skills necessary for specialisation, and to

topics which could become the focus of further studies. Ten students were supervised by researchers and postdoctoral fellows based in the AIMS Research Centre. A full list of the essay topics is included below.

Name	Gender	Origin	Essay Topic	Supervisor	University Affiliation
Abey Sherif Kelil	м		Gauss Quadrature for refinable functions	D. Kubayi & J. De Villiers	Stellenbosch
Alain Julio Mbebi	M		On Optimal Arbitrage	R. Ghomrasni	AIMS
Aline Uwimbabazi		-	Executable Biology	W. Visser	Stellenbosch
Antoine Bahizi	M	-	An Investigation into the Prevalence of HIV/AIDS among Elderly People in Region A. E. Cape Province	R, Shell	Western Cape
				STREET, STREET	NAME OF TAXABLE PARTY.
Arlette Sohanfo Ngankeu	E		Angle Resolved Photoemission Spectroscopy: a powerful tool to probe the low-energy electronic structure of correlated systems.	E. Carleschi	Johannesburg
Christelle Nangne	F.		Credit Risk modelling in complete markets	5. Mataramvura	Cape Town
Clarence Chishimba	M		Solvable and Nilpotent Lie algebra	J. Nidogmo	Witwatersrand
Taude-Michel Nzotungicimpaye	M	100	Statistical modelling and analysis of air quality	D. Steyn & B. Abiodun	British Columbia & Cape To
Parlison Nyirenda	M	-	Reduction of elliptic curves	F. Breuer	Stellenbosch
David Wakyiku	M		LIBOR Market Models with Stochastic Basis	R. Ghomrasmi	AIMS
Dessalegn Amenu Hirpa	M		Mathematical Programs with Equilibrium Constraints	M. Ali	Witwatersrand
Didam Gwazah Adams Duniya	M	п	Black holes as cosmological probes	B. Bassett	AIMS
va Liliane Ujeneza	F		Droughts in Western Cape: Statistical analysis of the trend and variability in present-day and	B. Abjodun	Cape Town
vans Doe Ocansey	м		future climates The Matrix-Tree Theorem	S. Wagner	Stellenbosch
		=			
aroog Kyeyune	M	==	Investigation of the electronic discharge circuit of a N2 laser	E.G. Rohwer & H.M. Von Bergmann	Stellenbosch
rances Ogochukwu Odumodu	F	111	Elliptic curves with complex multiplication	A. Keet	Stellenbosch
Setachew Mehabie Mulualem	M		Error correcting codes and finite fields	C. Naude	Stellenbosch
Hamidou Mouridi Mhoussini	M	-	Generating functions	M. Archibald	Cape Town
terve' Dimy Anguimaibondzi	M	74	Modelling multivariate data	H.G. Mwambi & E.O. Otumba	KwaZulu-Natal & AIMS
tuzifa Mohammed Ahamed Mohamme Ingur	d M	=	Demilty Functional calculation and Applications	H. Schwoerer	Stellenbosch
kechukwu Patrick Affadi	M	11	Growth Rate and cosmic curvature	B. Bassett	AIMS
saac Owino Okoth	M	-	Finite fields	M. Berman	Cape Town
ustina Ebele Okeke			Dynamical systems analysis of an epidemiological model	K.S. Govinder	KwaZulu-Natal
	M	-	AC ATAMININA DEL DE MEDICENS ATOMES DE LA ACTION DE LA CONTRA LA CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DEL CONTRA DEL CONTRA DE LA CONTRA DEL CONTRA DE LA CONTRA DE LA CONTRA DEL CONTRA	W.J. Perold	Steflenbosch
Cazage J. Christophe Utuje			Nanoscale sensors using graphene and carbon nanotubes		
Comi Afassinou	M	0	Hidden symmetries and the Asian Option PDE	K.S. Govinder	KwaZulu-Natal
Maile Abisae Khati	M	-	Portfolio Optimization in Discrete Time	R. Ghomrauni	AIMS
Mariam Merghani Fatheirhman Taha			Matchings in graphs: theory and algorithms	S. Wagner	Stellenbosch
Kasimba Energy Sonono	M	-	Calibration of financial models to market prices	P. Ouwehand	Stellenbosch
Naurice Ndashimye	M	-	Tableau methods for epistemic modal logics	K. Britz & I. Varzinczak	CSIR
Abiya Stephanie Mwika	E	1	Sensor networks for detecting events	S.W. Utete	CSIR
Mebratu Fenta Wakeni	M		Nonlinear Dynamics of Waves	R. Paskauskas	NITheP
Mekdes Ayalew Tessema	F		Particulate Matter (PM10) Pollution in Khayelitsha, Cape Town	D. Steyn & B. Abiodun	British Columbia & Cape To
Mensah Kekeli Folly-Gbetoula	M		Symmetry analysis of Fisher's Equation	K.S. Govinder	KwaZulu-Natal
Michael Kateregga	M		Hedging barrier options	P. Ouwehand	Stellenbosch
Milaine Sergine Seuneu Tchamga			Assessing Functional Similarity Measures for Protein Analysis at the Functional Level	N. Mulder & G.K. Mazandu	Cape Town & AIMS
Mogtaba Ahmed Yousif Mohammed	M		Eigenvalues of the Laplacian	J. Ratzkin	Cape Town
Mohammed Mohamad Abdelmajed Abas Mostafa	м	=	Archipelagian Cosmology	B. Bassett	AIMS
halaby Aohmmed Alsiddig Alamin Ahmed	120	-	Modelling the Bottom Element and union a Specified Edd. PME state.	D. Steyn	British Columbia
Auzamil Mahgoub Mohamed Yahia	M	=	Modelling the Bottom Ekman Layer using a Specified Eddy Diffusivity	515-5000 115	Cape Town
The state of the s	M	=	Linear complexity in LFSR-based stream ciphers	C.Swart	A PORT OF STREET
lahla Mohamed Ahmed Ibrahim	F		Optimal spanning trees	S. Wagner	Stellenbosch
łosiphiwo Tivelele Zwane	F	-	Large Energy Effective Theory studies of 8 meson decays	A.S. Cornell	Witwatersrand
Obeng Appiagyei Addai	M		The Korn-Kreer-Lennsen Model	R. Becker	Cape Town
Obiora Cornelius Collins	M		Water-borne diseases: the case of cholera	K.S. Govinder	KwaZulu-Natal
taphael Chibuzo Chukwemeka Okoye	M		Temporal pulse shaping / 2011-04-04	E.G. Rohwer & P. Neethling	Stellenbosch
avannah Nuwagaba	F		Modelling the interaction of HIV virus with the immune system including the effect of therapy	H.G. Mwambi & E.O. Otumba	KwaZulu-Natal & AIMS
erges Zambou	M		Spin tunnel transport in low-dimensional and nanostructured carbon systems	5. Bhattacharyya	Witwatersrand
idiki Zongo	M	-	Analysis of Lensed Galaxies Discovered in the H-ATLAS Maps	L. Leeuw	Johannesburg
oliu Adegboyega Raheem	M	11	Remote Monitoring of Safe and Risky Regions of Toxic Gases in Underground Mines: a preventive safety measures	I.O. Osunmakinde & O.A. Osibote	CSIR
olofomampionona Fortunat Rajaona	M	10	Model checking	J. Sanders & I. Rewitzky	United Nations & Stellenbo
omiwa Ajagbonna	M		Investigate the generation and detection of THz pulse	E.G. Rohwer & P. Neethling	Stellenbosch
ovohery Hajatiana Randrianarisoa	M		The Mordel Theorem	F. Breuer	Stellenbosch
simampoizina Marie Sophie	ř		Variability of the Indian Ocean	C. Reason & D. Steyn	British Columbia & Cape To
tandriamahefasoa /ivian Akpene Apety		_	Chaotic dynamical systems	M.F. Maritz	Stellenbosch
Vetsi David Poka	M	=			Stellenbosch
retai David Poka	M	-	Modelling the role of drug lords in drug epidemics	F. Nyabadza	atellenoosch



Graduation

All Fifty-five students graduated with the Postgraduate Diploma in Mathematical Sciences at a special ceremony on 23 June 2011. The three Vice-Chancellors from the local universities officiated the proceedings, and the guest speaker was Professor Aggrey Ambali, Director Policy Alignment and Programme Development at New Partnership for Africa's Development (NEPAD).

Five outstanding students were retrospectively awarded scholarships in recognition of their excellent academic achievements at AIMS. These awards were as follows:

Martin Rees Scholarship

- Mr Farooq Kyeyune
- Stephen Hawking Scholarship - Mr Kazage Utuje
- Paul G. Allen Family Foundation Scholarship - Mr Tovohery Randrianarisoa
- AIMS Victor Rothschild Scholarship - Ms Ogochukwe Frances Odumodu
- AIMS Victor Rothschild Scholarship
- Mr David Wakyiku



In the course of the year, students also attended various extramural activities and outings, among them an excursion to Stellenbosch to attend a Libertas Choir recital and trips to the Iziko Museums, Robben Island and Zip Zap circus. In January 2010, students attended a Mathematics Puzzle Party arranged by AIMSSEC.







Progress of students after AIMS

Name	Origin	Programme	University/Institution	AIMS Bursary
Abey Sherif Kelil		MSc	Stellenbosch	Yes
Alain Julio Mbebi	-	Tutor	AIMS Senegal	- 10
Aline Uwimbabazi	-	MSc	Stellenbosch	Yes
Antoine Bahizi		MSc	Stellenbosch	Yes
	10			
Arlette Sohanfo Ngankeu		MSc	Johannesburg	Yes
Christelle Nangne				
Clarence Chishimba	-			
Claude-Michel Naotungicimpaye		MSc	Cape Town	Yes
Darlison Nyirenda	-	MSc	Stellenbosch	Yes
David Wakyiku	==	MMath	Cambridge	
Dessalegn Amenu Hirpa				
Didam Gwazah Adams Duniya		MSc	Western Cape	Yes
Eva Liliane Ujeneza		MSc	Cape Town	Yes
Evans Doe Ocansey				
Farsoq Kyeyune	-	MSc	Stellenbosch	Yes
Frances Ogochukwu Odumodu	11	MSc	Stellenbosch	Yes
Getachew Mehabie Mulualem				
Hamidou Mouridi Mhoussini	-			
Herve' Dimy Anguimaíbondzi	-	Tutor	AIMS Senegal	
Huzifa Mohammed Ahamed Mohammed		MSc	(Themba Labs	Yes
Elnour		100		
kechukwu Patrick Affadi	11	MSc	Johannesburg	
saac Owino Okoth		Lecturer	Maseno, Kenya	
Justina Ebele Okeke		PhD	RwaZulu-Natal	Yes
Kazage J. Christophe Utuje		PhD	Syracuse, USA	
Komi Afassinou		MSc	KwaZulu-Natal	Yes
Maile Abisae Khati	=======================================	THOSE STATE OF THE	Total Control of Control of Total Control of Control of Control of Control of Control of Control of Control	142
Mariam Merghani Fatheirhman Taha	ander .	MSc	Khartoum, Sudan	
Masimba Energy Sonono		MSc	Arteriores, pecars	
Maurice Ndashimye		MSc	Stellenbosch	Yes
	-	MSc		165
Mbiya Stephanie Mwika Mebratu Fenta Wakeni		PhD	Cape Town	11427
	_	1,000	Cape Town	Yes
Mekdes Ayalew Tessema		Lecturer	Jimma, Sudan	
Mensah Kekeli Folly-Gibetoula	<u>u-</u>	M5c	Witwatersrand	Yes
Michael Kateregga	==	MSc	AIMS	Yes
Milaine Sergine Seuneu Tchamga	100	MSc	CapeTown	Yes
Mogtaba Ahmed Yousif Mohammed Mohammed	=	PhD	Stellenbosch	Yes
Mohamad Abdelmajed Abas Mostafa Shalaby	=	MSc	Perimeter Institute	
Mohimmed Alsiddig Alamin Ahmed		PhD	KwaZulu-Natal	
Muzamii Mahgoub Mohamed Yahia				
Nahla Mohamed Ahmed Ibrahim		MSc	Stellenbosch	Ves
Nosiphiwo Tivelele Zwane	50.2	MSc	Perimeter Institute	
Obeng Appiagyei Addai	- 11			
Obiora Cornelius Collins		PhD	KwaZulu-Natal	Yes
Raphael Chibuzo Chukwemeka Okoye		MSc	Stellenbosch	Yes
Savannah Nuwagaba	==	MSc	Stellenbosch	Yes
Serges Zambou		PhD	Cape Town	Yes
Sidiki Zongo		MSc	Ithemba Labs	Yes
Soliu Adegboyega Raheem	-	MSc	Cape Peninsula University of Technology	Yes
Solofomampionona Fortunat Rajaona		MSc	AIMS	Yes
	10	MSc	Perimeter Institute	163
Tomiwa Ajagbonna		MSc MSc	Stellenbosch	Yes
Tovohery Hajatiana Randrianarisoa				
Tsimampoizina Marie Sophie Randriamahefasoa		MSc	Cape Town	Yes
Vivian Akpene Apety		MSc	Brock, Canada	
Wetsi David Poka		MSc	KwaZulu-Natal	Virs













































Alumni

June 2011 marked the end of the 8th year of delivery of the Postgraduate Diploma in the Mathematical Sciences. The table below summarises the progress of students who have completed the programme at AIMS over the last eight years.



	Total	Male	Female
AIMS intake	360	253	107
Master's in progress	105	71	34
Completed Master's	154	110	44
Part III, University of Cambridge	4	4	0
PhD in progress	118	92	26
Completed PhD	27	23	4.
PostDoc/Researcher	17	13	4
Teacher/Lecturer	58	43	15
Industry	24	19	5

In April 2011, several AIMS alumni attended and spoke at an international conference promoting the development of science in Africa, and AIMS in particular. It was held at the UNESCO headquarters in Paris from 14-15 April 2011. Leading scientists, political leaders and students discussed the need for pan-African initiatives to develop science and stem the brain drain on the continent.

Lydienne Matchie

Lydienne Matchie from Cameroon achieved a Bachelor's Degree in Pure Mathematics at the University of Yaounde and was selected for the AIMS program in 2008/2009.

She first heard about AIMS through her elder brother, Talla Fabrice, who is also a former AIMS student (2005/2006). "After my Bachelor's Degree, I wanted to continue in Applied Mathematics, but it was not possible back home since we did not have Applied Mathematics in our universities. I could also not think of leaving the country as I did not have the necessary funds. So when I was selected for the AIMS programme it was a dream come true for me. AIMS has been a wonderful opportunity for me."

"From a social point of view, AIMS is just what Africa needs. A place where young Africans can meet and think about African problems using one common language (mathematical sciences). I got to learn a lot about African culture. I also built strong relationships with students from other parts of the continent and until today we still help each other. Financially, AIMS gave me the opportunity to follow my postgraduate studies which I would not have been able to do due to lack of finance."

Lydienne completed her Master's at AIMS while registered at Stellenbosch University. She graduated with distinction and is currently pursuing her PhD in Financial Mathematics at the University of Freiburg, Germany (as a DAAD scholar).

"After my studies I am planning to go back to Africa, to share the knowledge I have acquired so far as for me this is one of the wonderful ways of helping to build the continent."





Courses towards BSc Honours in Mathematics with a focus in Biomathematics

The flexible nature of the AIMS model, where short intensive three-week courses are offered by leading visiting experts, means that AIMS is well-positioned to contribute to innovative university programmes in the mathematical sciences. In 2009 Stellenbosch University, in partnership with AIMS, introduced an Honours course in Mathematics with a focus in Biomathematics. To date, 12 South African students have completed this programme with the first semester of courses being delivered at AIMS and the second at Stellenbosch University. This year six students are registered for this degree which began in January 2011.



The Biomathematics courses taught at AIMS included the following:

Period	Lecturer(s)	Topic
3 Jan - 21 Jan	Aziz Ouhinou & Gaston Kazamunu Mazandu, AIMS	Ordinary and Partial Differential Equations, with some Time Delay Codes
24 Jan - 11 Feb	Jacek Banasiak, KZN & Miroslav Lachowicz, Warsaw	Small Parameter Methods in Mathematical Biology and Applied Sciences
21 Feb - 11 Mar	Douw Steyn, British Columbia	Mathematical Modelling of Natural Systems
14 Mar - 1 Apr	Bharat Biswal & Paul Taylor, New Jersey	Biomedical Signal Processing
11 Apr - 29 Apr	Jannie Hofmeyr, Stellenbosch	Systems Biology
2 May - 20 May	Wilson Lamb, Strathclyde	Applying Functional Analytic Methods to Evolution Equations
24 May - 10 Jun	Juliet Pulliam, Princeton	Introduction to Biomedical Sciences

AIMS Bursaries for study at South African Universities

Through the generous support of its donors, AIMS is able to offer half bursaries to its students each year to study at South African universities. This year AIMS awarded 24 such bursaries for Master's study and five bursaries for study towards PhDs (see the table under Progress of Students for the names of the bursary recipients).

DAAD scholarships for doctoral study

The German Academic Exchange Service (DAAD) also generously awarded seven scholarships within its DAAD/AIMS agreement which was signed in 2008. According to the agreement five in-region scholarships are awarded annually to AIMS for students from sub-Saharan Africa (excluding South Africa) for PhD studies in Mathematics. In addition to the new awards, scholarships of twelve DAAD scholars in their second and third year of study were renewed.

Two doctoral students, Tunde Tajudeen Yusuf and Farai Julius Mhlanga, from the 2008 cohort of DAAD scholars graduated in 2011. Jules Clement Mba will graduate in September 2011.

In April 2011, DAAD announced its new "Staff Development Programme for DAAD supported Centres of Excellence". AIMS has been identified as one of the 13 DAAD-selected Centres of Excellence. Dr Maurice Oduor from the Maseno University in Kenya is the first fellow in this programme to visit AIMS. His research visit of six months commenced on 1 July 2011.

New Awards for DAAD scholarships for 2011 were made to:

Nitin Chadan Rughoonauth (Mauritius)
Eric Ould Dadh Andriantiana (Madagascar)
Siaka Lougue (Burkina Faso)
Maye Yassin Ahmed Elmardi (Sudan)
Andry Nirina Rabenantoandro (Madagascar)
Rodrigue Yves M'Pika Massoukou (Democratic Republic of Con-

Rodrigue Yves M'Pika Massoukou (Democratic Republic of Congo)
Jacob Mahau Mateyisi (Lesotho)

University of Cape Town
Stellenbosch University
University of the Western Cape
University of Cape Town
Stellenbosch University
University of KwaZulu-Natal
Stellenbosch University

AIMS RESEARCH CENTRE

The research focus of the AIMS Research Centre (mathematical modelling in a multidisciplinary context) encompasses many areas in the mathematical sciences, and AIMS has selected the themes Mathematical Modelling in Biological Sciences, Finance and in Industry; Mathematical Physics, e.g. Cosmology and Astrophysics; and Mathematical Foundations and Scientific Computation for the initial phase. Research staff were appointed to develop these research foci and there have been several developments during the period under review.

Professor Bruce Bassett has successfully launched the Cosmology and Astrophysics research area at AIMS. In July 2010, he was seconded to AIMS from the University of Cape Town (UCT) for 50% of his time.

Professor Ronnie Becker's appointment was extended to 31 July 2013. Dr Clovis Oukouomi Noutchie's appointment as a part-time researcher was renewed, however, in January 2012 he was offered a tenured position as Senior Lecturer at North-West University, Mafikeng campus, and decided to move there. At the end of February 2011, Dr Ouhinou returned to Morocco to take up a lecturing position at the University of Cadi Ayyad, Marrakech. Dr Raouf Ghomrasni and Professor Alan Beardon continued at AIMS in their previous positions.

Five Distinguished Research Fellows have accepted appointments at AIMS in order to contribute to the research themes studied at AIMS; interact with and advise AIMS researchers and postgraduate students; and assist in strengthening the research profile of the Research Centre.

They are: Professor Wolfram Decker (Universität des Saarlandes, Germany), Professor Doron Lubinsky (Georgia Institute of Technology, USA), Professor Gerhard Pfister (Technische Universität Kaiserslautern, Germany), and Professor Peter Sarnak (Princeton University, USA) who will all support the Mathematical Foundations and Scientific Computation research focus, and Professor Philip Maini (University of Oxford, UK) who will advise on the Mathematical Modelling in Biological Sciences research thrust.

Eight postdoctoral fellows, three doctoral students and 23 Master's students have been supervised or co-supervised by researchers appointed at AIMS during the review period. A number of the postdoctoral fellows left AIMS (see below) and one new postdoctoral fellow was recruited. One PhD student has completed his doctoral study and graduated in June 2011. Nine Master's students have completed their studies and graduated, two with distinction.



Diego Mirandola from the University of Padova in Italy arrived at AIMS in October 2010 as the first ALGANT student to spend the first year of his Master's programme at AIMS/Stellenbosch. Through the Erasmus Mundus Programme, Stellenbosch University and AIMS have become partners in a consortium of universities whose vice-chancellors have approved a "joint" degree programme in the field of Algebra, Geometry and Number Theory. The consortium consists of Stellenbosch University/AIMS, some European universities co-ordinated by the University of Bordeaux and other international universities. Diego was based in the AIMS Research Centre until the end of December 2010. From January to June he studied at Stellenbosch University in the Department of Mathematical Sciences. He attended specialised courses in algebra, geometry and number theory. He will spend the second year of Master's study at the University of Bordeaux in France.









Professor Bruce Bassett

Professor Bruce Bassett is a graduate of the University of Cape Town, where he obtained a MSc in Applied Mathematics. After completing a PhD in Trieste, and a postdoctoral fellowship in Oxford, he lectured at the Institute of Cosmology and Gravitation at Portsmouth University. After a sabbatical at Kyoto University he returned to Cape Town to a joint position between the South African Astronomical Observatory and the Mathematics and Applied Mathematics Department at UCT, where he is a full professor.

He joined the AIMS Research Centre as a Senior Resident Researcher mid 2010 on secondment from the University of Cape Town and brought a substantive research group with him including a number of postdoctoral fellows and students.

He is also a member of the international MeerKAT Scientific Advisory Board which has recently considered frequency changes to the MeerKAT design. In addition, the cosmology group at AIMS is heavily involved in using SALT, the Southern African Large Telescope to study the cosmos.

Under Professor Bassett's leadership the Cosmology at AIMS group conducts research, runs workshops, seminars and regularly hosts visitors. Working jointly with ICTP in Trieste, Italy and Perimeter Institute in Canada, the group is organising a large international cosmology school in January 2012 which will bring top researchers to Cape Town, together with PhD students from the first and third world with the aim of building powerful and long-lasting research collaborations.

Professor Bassett is an author of over 80 research publications and the book "Introducing Relativity" which has been translated into several languages and which uses cartoons to bring the ideas of Einstein's Relativity to the public.

Dr Aziz Ouhinou

Dr Ouhinou graduated from the Université Cadi Ayyad, Marrakesh, Morocco with a PhD in Applied Mathematics.

He was originally appointed as a postdoctoral research fellow at AIMS in 2008 and then as a Resident Researcher in 2009 for three years. He conducted research in the biomathematics area and played an important role in helping to get the AIMS Research Centre off the ground. He supervised PGD, MSc and PhD students, attracted and worked with research visitors and presented special courses and seminars. Dr Ouhinou was responsible for

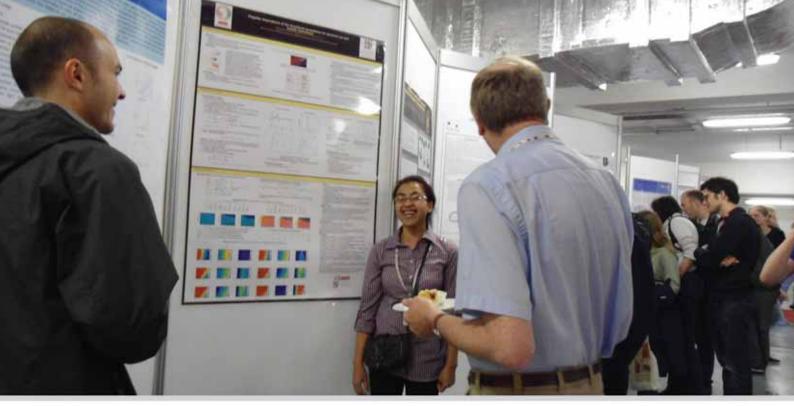
coordinating the programme for BSc Honours in Mathematics with focus in Biomathematics with the Department of Mathematical Sciences at Stellenbosch University, where he was appointed an Extraordinary Lecturer and gave a course on Advanced topics in Biomathematics.

In 2011, Dr Aziz Ouhinou, took up the postition of "Prof d'Ensignement Superieur" at the Université Cadi Ayyad.

Ludovic Tangpi Ndounkeu

Ludovic completed a four-year degree in Mathematics at the University of Yaoundé 1 with a focus on fundamental analysis before joining AIMS in August 2009 for the Postgraduate Diploma programme. His research essay focussed on the application of stochastic control to mathematical finance. After completing the Diploma with distinction, he remained at AIMS to complete a Master's by dissertation programme through Stellenbosch University, supervised by Dr Raouf Ghomrasni in the AIMS Research Centre. His thesis focussed on a model to hedge non-tradable risks and he completed this within 12 months. Ludovic was recently accepted for PhD studies in stochastic analysis at the

Berlin Mathematical School. "Growing up in a family where self-discipline, diligence and hard work were the pillars of education, I have been very dedicated in my studies, and this has been my greatest strength. The ambition of becoming a successful researcher in Applied Mathematics led me to AIMS where I went to seek a better opening to various mathematical fields and access to the top-class training given by the lecturers at AIMS. I actually gained a lot more from AIMS than what I was expecting. The skills, the network and the will to contribute to the rise of Africa I gained there, will make a big difference in my career."



Mihaja Ramanantoanina (PhD in progress), Master's students Fadoua El Moustaid and Alexia Rahanirina (pictured here) all attended the 8th European Conference on Mathematical and Theoretical Biology in Krakow, Poland, from 28 June to 2 July 2011 where they presented talks and posters.

Master's and doctoral students who graduated under supervision of researchers at AIMS

Student	Research field	Supervisor(s)	Graduation
Doctoral Studies			
Mhlanga, Farai	Mathematical Finance	Professor R Becker	June 2011
Master's Studies			
Matchie, Lydienne	Mathematical Finance	Dr R Ghomrasni, Dr P Ouwehand	December 2010 (distinction
Kouema Tchamga, Nicole	Mathematical Finance	Dr R Ghomrasni, Dr P Ouwehand	December 2010
Chopho, Mamello	Mathematical Finance	Professor R Becker	December 2010
Jones, Samantha	Mathematical Finance	Professor R Becker	December 2010
Zadikov, Ariel	Mathematical Finance	Professor R Becker	December 2010
Mokoma, Kaibe	Mathematical Finance	Professor R Becker	December 2010
Ejigu, Amsalework	Biomathematics	Dr A Ouhinou, Professor FJW Hahne	March 2011 (distinction)
Mancuveni, Conlias	Mathematical Finance	Professor R Becker	June 2011
Ashforth, James	Mathematical Finance	Professor R Becker	June 2011

Postdoctoral fellows at AIMS during the period July 2010 to July 2011

Fellow	Research field	Period	Comments
Regis, Marco	Observational & Theoretical Cosmology	1 Nov 2008 - 31 Oct 2010	Accepted a postdoctoral position in Torino, Italy
Smith, Mathew	Observational & Theoretical Cosmology	1 Nov 2008 - 30 Nov 2011	
Mambili-Mamboundou, Hermane	Lie group analysis of differential equations, Delay differential equations from Biology, Epidemiology	1 Jan 2009 - 31 Aug 2010	Took up an appointment at the Vaal University of Technology on 1 September 2010.
Kitio-Kwuimy, Cedrick	Modelling and non-linear dynamics of engineering systems	15 Aug 2009 - 31 Jan 2011	Left AIMS at the end of January 2011 to take up employment at Villanova University, USA.
Salmi, Petja	Oscillons	1 Jan 2010 - 1 Jan 2012	
Uys, Lafras	Coupling of biochemical reaction networks with advection-diffusion models	1 Jan 2010 - 31 Dec 2011	
Ödman, Carolina	Observational & Theoretical Cosmology	1 Sep 2010 - 28 Feb 2011	Appointed to the position of Director for Academic Development, at the AIMS- Next Einstein Initiative.
Marais, Magdaleen	Topics in Computational Algebra and Applications	1 Jan 2011 - 31 Dec 2012	

Visiting researchers

The visitors' programme has continued to attract a number of researchers from all over the world. With AIMS' focus on Africa, a considerable number of visiting researchers have come from Africa. Most of them were at AIMS for periods of about two months. The researchers listed below were at AIMS during the period 1 August 2010 and 31 July 2011.

The AIMS Journal Club coordinated by Dr Raouf Ghomrasni continued with weekly and sometimes fortnightly meetings. Some 29 presentations were delivered by resident and visiting researchers, postdoctoral fellows and research students during the review period. In addition, Professor Bruce Bassett initiated a seminar series in cosmology in September 2010 where researchers, mainly from abroad, presented seminars to his group as well as to local cosmologists and astrophysicists at regular intervals.



Name of Visitor	Research field	Period of visit
Kassa, Semu Mitiku Addis Ababa University	Biomathematics, Operations Research	1 Sep 2009 - 31 Aug 2010
Ngom, Papa Université Cheikh Anta Diop	Spatial statistics and bayesian analysis	19 July - 2 Sep 2010
Thami Akrid Universté Cadi Ayyad	Asymptotic behaviour of solutions of non-densely non-autonomous retarded differential equations.	4 - 31 Aug 2010
Jean Jules Tewa University of Yaounde	Analysis of the influence of loss of sight individuals in sub-Saharan Africa, through a tuberculosis model and AIMS model and a co-infection tuberculosis-AIMS model	15 Aug - 15 Sep 2010
Lubna Mohammed - Salih University of Khartoum	Modelling complex networks	20 Aug - 20 Oct 2010 21 Mar - 21 Jul 2011
Armel Andami - Ovono University of Picardie	Partial Differential Equation (P.D.E). More precisely in the study on Nonlocal Diffusion equation	15 Sept - 13 Nov 2010
Douw Steyn University of British Columbia	Air pollution meteorology, model evaluation, boundary layer meteorology, mesoscale meteorology	4 Oct 2010 - 30 Apr 2011
Herve Germain Enjieu Kadji Tohoku University	Neuroscience dynamical systems	14 Nov 2010 - 12 Jan 2011
Rhoda Hawkins University of Bristol	Active (out of equilibrium) materials applied to biological cells	20 Nov 2010 - 21 Jan 2011
Rejoyce Gavhi Stellenbosch University	Wavelet & Subdivision Analysis	28 Nov 2010 - 29 Jan 2011
Nima Khosravi Shahid Behestid University	Inflationary models	4 Jan - 12 Feb 2011
David Minda University of Cincinnati	Geometric function theory	5 Jan - 2 Apr 2011
Claudia Quercellini Università degli Studi di ROMA Tor Vergata	Astronomy	8 - 20 Feb 2011
Kinvi Kangni University of Cocody	Harmonic Analysis	1 Mar - 30 Apr 2011
Conrad Tabi University of Yaounde	Soliton-like excitations and formation of N-localised structures in the DNA complex	9 Mar - 22 Apr 2011
Roberto Trotta Imperial College	Astrostatistics	27 Mar -1 May 2011
Gigi Thomas University of Botswana	Biomathematics	12 Apr -11 Jun 2011
Martin Kunz University of Geneva	Cosmology	8 Jun - 7 Jul 2011
Aziz, Ouhinou University of Cadi Ayyad	Biomathematics	5 Jul - 31 Aug 2011
Kazeem Gbolagade University for Development Studies	Computer Science	8 Jul - 18 Aug 2011

Honours and Achievements

During the review period AIMS researchers and postgraduate students were recognised as follows:

- Professor Ronnie Becker was invited to become a reviewer for Mathematical Reviews during 2010. He has recently completed a review for Mathematical Reviews.
- Dr Raouf Ghomrasni was invited to participate in one of the prestigious Oberwolfach workshops in Germany (Stochastic Analysis in Finance and Insurance, 23 to 29 January 2011).
- Dr Carolina Ödman was appointed as a co-organiser of the dotAstronomy workshop in Oxford (4 to 6 April 2011).
- Professor Bruce Bassett was an invited lecturer at the CERN/FNAL/ICTP African School of Physics, STIAS, in August 2010.
- Professor Bruce Bassett was interviewed for a New Scientist article on 2 August 2010 (Is a cosmic chameleon driving galaxies apart?).



The following research outputs based on work done either wholly or partially at AIMS, have been published in 2010 and 2011 to date, or are in press:

Articles in peer-reviewed journals

- J Nordin, L Ostman, A Goobar, R Amanullah, RC Nichol, M Smith, J Sollerman, BA Bassett, J Frieman, PM Garnavich, G Leloudas, M Sako, DP Schneider. Spectral properties of Type Ia supernovae up to z~0.3.
 Astronomy and Astrophysics, 526 (2011), A119.
- L Ostman, J Nordin, A Goobar, R Amanullah, M Smith, J Sollerman, V Stanishev, MD Stritzinger, BA Bassett, TM Davis, E Edmondson, JA Frieman, PM Garnavich, H Lampeitl, G Leloudas, J Marriner, RC Nichol, K Romer, M Sako, DP Schneider, C Zheng. NTT and NOT spectroscopy of SDSS-II supernovae. Astronomy and Astrophysics, 526 (2011), A28.
- C Zunckel, P Okouma, S Muya Kasanda, K Moodley, BA Bassett. Fundamental Uncertainty in the BAO Scale from Isocurvature Mode. Physics Letters B, 696 (2011), 433-437.
- J Newling et al (including BA Bassett, B Martin, M Smith and M Varughese from AIMS). Statistical Classification Techniques for Photometric Supernova Typing. Monthly Notices of the Royal Astronomical Society, 414 (2011), 1987-2004.
- PA Taylor, JC Miller and PH Podsiadlowski.
 Long-duration gamma-ray bursts: hydrodynamic instabilities in collapsar discs. Monthly Notices of the Royal Astronomical Society, 410 (2011), 2385-2413.
- A Elazzouzi and A Ouhinou. Optimal Regularity and stability analysis in the alpha-norm for a class of partial functional differential equations with infinite delay. Discrete and Continuous Dynamical Systems – A, 30(1) (2011), 115 – 135.



- Professor Douw Steyn, during the period he was based at AIMS, was awarded a mentorship medal by the Board of Directors of the Canadian Federation of Earth Sciences. CFES/FCST awards the medal annually to nominees from all sectors and specialisations within the earth science community.
- Dr Melvin Varughese, a member of the cosmology group at AIMS (and lecturer at UCT) was awarded the Sichel Medal by the South African Statistical Association. The medal rewards the best statistics paper published the previous year in a peer-reviewed journal by a South African statistician.
- James Newling, MSc student in the cosmology group, was awarded a Faculty Research Associateship at UCT for 2011 (one of only two MSc awards in the entire faculty).
- SM Kassa and A Ouhinou. *Epidemiological models with prevalence dependent endogenous self-protection measure.* Mathematical Biosciences, 229(1) (2011) 41 49.
- T Akrid, L Maniar and A Ouhinou. Spectral criteria and almost periodic solutions for a class of non autonomous semilinear boundary Cauchy problems. International Journal of Evolution Equations, 5(2) (2011), 177 – 195.
- R Ghomrasni. A generalised occupation time formula for continuous semimartingales. Studia Sci. Math. Hungar. 47(1) (2010), 54-58.
- R Ghomrasni and O Menoukeu Pamen. Decomposition of order statistics of Semimartingales using local times. Stochastic Analysis and Applications, 28 (2010), 1-13.
- CA Kitio Kwuimy, B Nana and P Woafo. Experimental bifurcations and chaos in a modified self-sustained macro electromechanical system. Journal of Sound and Vibration, 32 (2010), 3137-3148.
- C Chiyaka, Z Mukandavire, P Das, F Nyabadza, SD Hove-Musekwa and H Mwambi. Theoretical analysis of mixed Plasmodium malariae and Plasmodium falciparum infections with partial cross immunity.
 Journal of Theoretical Biology, 263 (2010), 169-178.
- MR Sidi Ammi and DFM Torres. Hölder's and Hardy's Two Dimensional Diamond-alpha Inequalities on Times Scales. An. Univ. Craiova. Mat. Inform., 37(1) (2010), 1-11.
- A Elazzouzi and A Ouhinou. Variation of constants formula and reduction principle for a class of partial functional differential equations with infinite delay.
 Nonlinear Analysis, 73 (2010), 1980 – 2000.

- CB Tabi, A Mohamadou and TC Kofane. Modulational instability in the anharmonic Peyrard-Bishop model of DNA. European Physical Journal B, 74 (2010), 151-158.
- CB Tabi, A Mohamadou and TC Kofane. Long-range interactions and wave patterns in a DNA model. The European Physical Journal E, 32 (2010), 327 – 332.
- CB Tabi. Energy Localization in an Anharmonic Twist-opening Model of DNA Dynamics. Journal of Physics: Condensed Matter, 22 (2010), 414107.
- S Zdravkovic and CB Tabi. Two possible approaches in Peyrard-Bishop-Dauxois model of DNA dynamics.
 Journal of Computational and Theoretical Nanoscience, 7(8) (2010), 1418 – 1424.
- SC Oukouomi Noutchie. Existence and uniqueness of conservative solutions for nonlocal fragmentation models. Mathematical Methods in the Applied Sciences Journal, 33 (2010), 1871 -1881.
- SC Oukouomi Noutchie. Analysis of the effects of fragmentation-coagulation in planktology. Comptes Rendus Biologies, 333 (11/12) (2010),761 – 874.
- G Magombedze, P Nduru, CP Bhunu and S Mushayabasa. Mathematical modelling of immune regulation of type 1 diabetes. Biosystems, 102 (2-3) (2010), 88-98.
- R Kessler, B Bassett, P Belov, V Bhatnagar, H Campbell, A Conley, JA Frieman, A Glazov, S Gonzalez-Gaitan, R Hlozek, S Jha, S Kuhlmann, M Kunz, H Lampeitl, A Mahabal, J Newling, RC Nichol, D Parkinson, N Sajeeth Philip, D Poznanski, JW Richards, SA Rodney, M Sako, DP Schneider, M Smith, M Stritzinger, M Varughese. Results from the Supernova Photometric Classification Challenge. Publications of the Astronomical Society of the Pacific. 122, (2010) 1415 – 1431.

To appear:

- RI Becker, I Lari, F Ricca and A Scozzari. Locating Median paths on Connected Outerplanar Graphs. Networks, (2010) in press.
- AF Beardon, KA Driver and K Jordaan. Zeros of polynomials embedded in an orthogonal sequence. Accepted by Numerical Algorithms.
- AF Beardon. The Theorems of Stieltjes and Favard.
 Accepted by Computational Methods and Function Theory.
- AF Beardon. Pythagorean Equations. Accepted by Mathematical Gazette.
- AF Beardon and CD Minda. The diameter of a hyperbolic disc. Accepted by Complex Analysis and Operator Theory.
- AF Beardon. Cyclic absolute difference of integers.
 Accepted by American Mathematical Monthly.
- B Green. Bounds on the automorphisms of curves over algebraically closed fields. Accepted by the Israel Journal of Mathematics.

Chapters in books

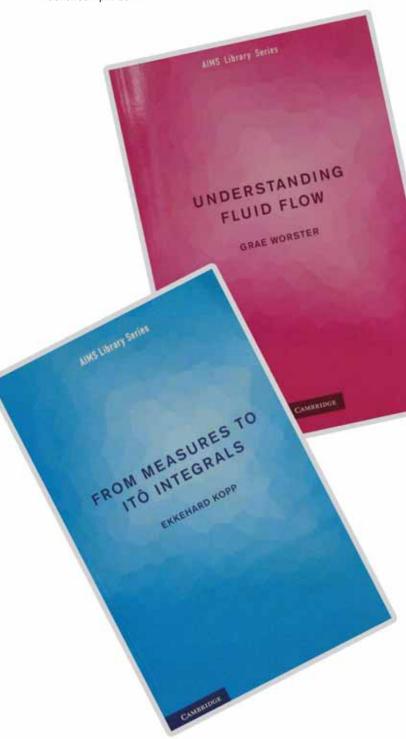
To appear:

 J Rohwer and L Uys. Systems Biology and Metabolic Modeling. In Moore PH and Botha F (eds), Physiology of Sugarcane, Wiley-Blackwell.

The AIMS Library Series

To date three books in the series have been published while another three have been commissioned. The published books are:

- 1. *Understanding Fluid flow*, by Grae Worster Published January 2010
- 2. Creative Mathematics, by Alan F. Beardon Published March 2010
- 3. From Measures to Ito Integrals, by Ekkehard Kopp Published April 2011



REVIEW OF AIMS

AIMS and its Research Centre were reviewed this year by a high profile panel of scientists including Professor David Gross (USA, Nobel Laureate in Physics, 2004), and leading mathematicians Professor David Bekolle (Cameroon), Professor Gerhard Frey (Germany) and Professor Sunil Maharaj (South Africa), as well as Dr Romilla Maharaj (representing the South African National Research Foundation). The panel visited AIMS in March 2011, where they interviewed students, staff and researchers.

The panel concluded that: "AIMS has made substantial progress in various activities in the short period since its formation. This is reflected in the number of graduating Diploma students, the production of research publications and the growth in educational outreach activities.

The core functions are contained in the AIMS Diploma Programme, the AIMS Research Centre and the AIMSSEC school enrichment activity. There is substantial evidence that the associated activities with the core functions are having a strong and meaningful impact and we therefore recommend that they continue to be fully supported, adequately resourced and properly funded into the future."



AIMS SCHOOLS ENRICHMENT CENTRE (AIMSSEC)



Established in 2003, AIMSSEC seeks to extend educational opportunities to disadvantaged communities in South Africa; to introduce new skills for the teaching of mathematics and to raise standards of education.

AIMSSEC has expanded its professional development programmes for mathematics teachers in partnership with Stellenbosch University and the University of Fort Hare. The benefits are spread widely to reach many teachers and learners through the training of chosen teachers to be subject leaders, through the provision of resources, through training teachers to run workshops for their colleagues and by giving continued support for lifelong learning through the AIMING HIGH Teachers' Network.

AIMSSEC runs two types of professional development courses for mathematics teachers based on a blended-learning approach: the "Mathematical Thinking" (MT) course (three months); and the two-year Advanced Certificate in Education (ACE) course.

The MT course has been run sixteen times for a total of 860 teachers and subject advisers (primary and secondary) from all parts of South Africa. In April and July 2011 AIMSSEC presented residential courses for a total of 178 teachers with sixty-five hours of face-to-face mathematics workshops. The teachers submit two assignments in the subsequent three months based on how they have put into practice what they have learnt on the course. The course focusses on subject knowledge and teachers write a mathematics exam at the end of the residential unit. Computer skills are developed including the use of free software in teaching mathematics. A learner-centred, activity-based approach to teaching is encouraged with an emphasis on understanding and a shift away from 'chalk and talk' and rote learning.

The preliminary MT course is a pre-requisite for the two-year ACE to train Mathematics Subject Leaders. The ACE is an innovative, blended learning, technology enriched programme taught in partnership with both Stellenbosch University and the University of Fort Hare. The students attend residential units in January and July each year and are committed to ten hours a week home study guided by the lecturers who answer their questions through the Moodle course management system (http://aimssec-moodle.aims.ac.za). Students submit regular assignments, attend workshops in their own areas which are broadcast from Stellenbosch on the Interactive Telematic Education TV system, and write examinations each year.

Twenty-one teachers and subject advisers graduated from the ACE course at Stellenbosch University in December 2010. 73 students are currently registered for the ACE course with the Institute for Mathematics and Science Teaching of the University of Stellenbosch (IMSTUS) and 70 students with the University of Fort Hare.

A learner-centred, activity-based approach to teaching is encouraged with an emphasis on understanding and a shift away from 'chalk and talk'...

The Eastern Cape Department of Education (ECDOE) has commissioned AIMSSEC to train 12 subject leaders, from each of the 23 school districts (276 subject leaders in total) over the next four years. The ECDOE gives this opportunity for teachers to occupy a leadership position





in their area by supporting them with a bursary to cover the tuition costs. AIMSSEC has already trained 325 teachers from the Eastern Cape on the MT courses.

The Zenex Foundation has sponsored a three-year independent evaluation of the AIMSSEC Fort Hare ACE course to be conducted by Kelello Consulting with Professor Jill Adler, University of the Witwatersrand, as adviser. The evaluation will determine how the graduates put into practice in their teaching what they have learnt on the course, and the effects on the attainment of their learners.

To empower teachers, a series of 16 books – the AIMING HIGH Book Series (subsidised by Cambridge University Press) – is being written by the AIMSSEC international team. This team is writing the chapters for the AIMING HIGH books based on their experience of teaching in South Africa and other developing countries. The books provide workshop guides for teachers. The first book in the series will be published in 2012 and several of the others are in an advanced stage of preparation.

A number of AIMS students have signed up to answer questions on Dr Math (a mobile text message question and answer service using MXit). AIMSSEC has developed 70 apps for learning mathematics on basic cellphones using MXit software and targeted at developing countries. AIMSSEC also formed a partnership with the Cambridge University Millennium Mathematics Project to develop maths apps for smartphones which AIMSSEC will trial with learners in local disadvantaged communities.

The Saturday mathematics enrichment classes for grade 10 - 12 learners continued this year and we concentrated on enrichment work and the National School Certificate

Paper 3 work, which is optional and not taught at most schools. On average 28 learners attended these classes.

AIMSSEC is planning to introduce an AIMING HIGH 'Mathematics with Wings' course to develop teachers beyond the school level and to inspire them to learn more university level mathematics. The course will consist of two-week modules in the April and July school holidays.

AIMSSEC encourages teachers to become committed to lifelong learning and to help each other in this endeavour through the AIMING HIGH Teacher Support Network that links groups of teachers around the country.

AIMSSEC has built capacity in this network by setting up two new Interactive Telematic Education (ITE) Learning Centres in Mthatha and Queenstown in the Eastern Cape.

Barrie Barnard and Toni Beardon are responsible for the management of AIMSSEC and all the distance teaching. Elizabeth Turok and Sari Smit were appointed as part-time lecturers in October 2010. Cynthia Fries and Jai Grover were appointed as teaching assistants in January 2011. Najwa Chellan continued as the AIMSSEC administrative officer. There are plans to expand this team in the near future.

Fifteen visiting lecturers from around the world taught on the AIMSSEC residential courses in 2011 as unpaid volunteers, introducing perspectives on teaching and learning mathematics and a style of teaching that reflects commonly agreed good practice worldwide. Former AIMSSEC students, who have graduated from the ACE subject leader programme, worked as teaching assistants on the residential courses.

COURSES & CONFERENCES

On 12 November 2010 Professor Green hosted a colloquium at AIMS on **Algebra, Number Theory and Selected Topics** in honour of Dr Kenneth Hughes who is retiring from the University of Cape Town (UCT). Dr Hughes was very involved and influential in academic life at UCT in many roles, having taught in the Departments of Mathematics and Applied Mathematics, Economics and Law. While the morning session of the colloquium was devoted to mathematics, the afternoon presentations focussed on a variety of interesting topics.

As part of the conference on **Arithmetic Geometry** held by Stellenbosch University in January 2011, a day of talks was held at AIMS, and students and staff were able to attend.

The annual **Summer School in Mathematical Finance** was held for the fourth time at AIMS from 17 to 19 February 2011. The school was attended by delegates from 11 financial and ten academic institutions in and around South Africa. Special lectures were presented by Professor Bruno Dupire (Bloomberg L.P, USA), Dr Jörg Kienitz (Deutsche Postbank AG, Germany), and Professor William Shaw (University College London, UK). Topics included: Functional Ito Calculus and Financial Applications, Stochastic Volatility and Levy Process based Models in Finance, and Modelling and Optimizing Risk in non-Gaussian Financial Mathematics. The workshop was co-sponsored by Standard Bank, Old Mutual and JSE with a total of 79 attendees.

An introductory level **Open Source GIS Course** was held at AIMS from 23 to 27 May 2011.

In May/June 2011, the South African Centre for Epidemiological Modelling and Analysis (SACEMA), in collaboration with AIMS, held a 2-week modelling clinic that emphasised the use of data in understanding infectious disease dynamics. The Clinic brought graduate students, postdoctoral fellows, and researchers from the United States, Canada, and Africa together to engage in epidemiological modelling projects that use real data to grapple with practical questions in a meaningful way.

The CIMPA-UNESCO-MESR-MICINN-APSA-SOUTH AFRICA research **School on Modelling and Simulation in Population Biology** was held at AIMS from 13 to 18 June 2011. It focussed on the mathematical modelling of complex dynamical systems that arise in population biology. Selected scientists, mathematicians and students working in the field of modelling and computational simulation of biological populations participated in the school.

The **Applications of Mathematics in Biology and Medicine**, which was held at AIMS from 4 to 8 July 2011, introduced students to a wide range of applications of mathematical and statistical techniques in various areas of biology and medicine. It was attended by 55 participants, 34 of whom were South African students.

The two-week Introduction to Applied Biostatistics course for Southern African postgraduate students was organised by SACEMA, UKZN and Ghent University, and held at AIMS from 11 to 22 July 2011. The purpose of the course was to train Southern African students in the



basic concepts and the most commonly applied methods of biostatistics and so contribute to capacity building in this important field. It was attended by 36 students.

Special seminars

- World renowned physicist Professor Kip Thorne (Caltech) visited AIMS on 24 November 2010. He delivered a special lecture on Black Holes, Wormholes, and Spacetime Singularities in which he described the current theoretical understanding of black holes, wormholes and spacetime singularities, including recent breakthroughs achieved with the aid of computer simulations.
- In December 2010, Professor Neil Turok (Waterloo) gave a seminar entitled: "Solution of the Measure Problem in Cosmology"
- Professor Jan Nordstrom (Department of Mathematics, Linkoping University) visited AIMS and presented a seminar on Computational Mathematics in January 2011.
- Dr Wai Yi Feng (University of Cambridge, Royal Society Fellow in Mathematics Education) gave a seminar at AIMS on Mathematical Enrichment in Education in March 2011
- In May 2011, Professor Ben Turok gave a talk on NEPAD.



PUBLIC LECTURE SERIES

During the period under review, AIMS launched a series of lectures for the public in collaboration with the Cape Town Science Centre. The lectures entitled "Science Out Loud" were presented in the Muizenberg Pavilion or at AIMS. They were attended by members of the public and AIMS students. The following lectures took place in the period under review:

- Professor Bruce Bassett (a senior researcher at AIMS, SAAO and UCT) gave the first lecture on "The Dark Cosmos" at the Muizenberg Pavilion on 27 October 2010
- On 2 December 2010 Professor Douw Steyn (a visiting senior researcher from the University of British Columbia, Vancouver, Canada) gave the second talk on "Air Pollution: How we treat the atmosphere like a sewer".
- Dr Tadashi Tokieda (a visiting lecturer at AIMS from Trinity Hall, University of Cambridge, UK) spoke on "Science from a sheet of paper" on 20 January 2011.

- On 24 February 2011, Professor Nick Segal (Extraordinary Professor, Gordon Institute of Business Science, University of Pretoria) gave a public lecture entitled "Why does South Africa face a water crisis?"
- On 20 April 2011, Professor George Ellis (UCT) spoke on how technology affects our lives, and the issues that arise in shaping it to meet our future needs.
- On 9 May 2011, Baroness Susan Greenfield spoke on "The 21st Century Mind: How will technology change it?"
- On 15 June 2011, Professor Mike Bruton, presented an illustrated overview of inventions, made by South Africans, that have reached world markets.



AWARDS

Professors Fritz Hahne and Neil Turok were jointly awarded the South African Mathematical Society's Award for the Advancement of Mathematics 2010 in recognition of their efforts in establishing AIMS. This announcement was made at the SAMS Conference in October last year. According to the chair of the SAMS Award committee, Professor Jamshid Moori, "Mathematics in South Africa and Africa as a whole has benefited a lot from the AIMS initiative, so the award is very well deserved." The Award serves to recognise and reward exceptional and distinguished service in the cultivation of Mathematics in South Africa. Professors Hahne and Turok were unable to attend the conference, but their letters of acceptance were read out to the audience.

AIMS founder, Professor Neil Turok was selected as one of the 2010 Laureates for the World Innovation Summit for Education (WISE). He won the award for AIMS-NEI which he launched after winning the TED prize in 2008. The Qatar Foundation and the WISE Awards International Jury announced the six winning projects under the theme of Transforming Education: Investment, Innovation and Inclusion. The projects were selected from hundreds of applications originating from 89 countries and all regions of the world. The awards are designed to reward, showcase and support outstanding and innovative educational projects from across the world and from all educational sectors.

JOINT INITIATIVES

On 5 November 2010, Dr Thulani Dlamini, Group Executive for Research and Development at the Council for Scientific and Industrial Research (CSIR), and Professor Barry Green (AIMS) signed a memorandum of understanding at the CSIR in Pretoria. The two institutes have agreed to cooperate in the following areas: linking of AIMS essay topics to specific programmes at CSIR; teaching of courses by CSIR employees; bridging courses for CSIR students and employees; visiting scientists; scholarship funding; and internship programmes. Two further meetings of the joint committee were held during the year. A second memorandum of understanding was also signed with Professor Alain Damlamian (CIMPA) in which AIMS undertakes to host a biennial CIMPA School. The agreement was signed on 15 June 2011.

AIMS was invited to take part in the special year of activities planned for 2013 under the theme "Mathematics of Planet Earth 2013". A planning meeting at the American Institute for Mathematics (AIM) was held in March 2011 in connection with this.

Partnership agreements have also been entered into with Université degli Studi di Roma "Tor Vergata", Italy and Université de Montréal, Canada.



MEETINGS ATTENDED

During the year Professor Green gave presentations on the AIMS model and building and growing science in Africa at the following international meetings:

- The 1st International Conference of Total Quality Management in K-12 Education, Riyadh, 8 to 12 January 2011.
- UNESCO conference, Afrique: le choix de la science, l'example de l'initiative AIMS, Paris, 14 to 15 April 2011. This meeting was devoted to the development of AIMS through NEI and in particular the creation of its second centre in AIMS-Sénégal, which will be opened in September 2011.
- World Conference of Science Journalists, Doha, 26 to 30 June 2011. At this conference, attended by over 700 delegates, he was a member of the Plenary Panel Session on "Science as a Force for Change: Africa". The session was produced by Ms Lisa Lambert in her role as Manager of External Relations for the Perimeter Institute for Theoretical Physics. It was moderated by, and included, African journalists.

Special talks on AIMS were also presented at the following local meetings:

- The Africa University Day Research Seminar held in Stellenbosch in November 2010,
- The Physics camps for learners and teachers convened by the Department of Science and Technology in Pretoria in December 2010.
- Education Week Conference in Johannesburg, 6 to 8 July 2011.

Further meetings attended included:

- A Donor Conference Networking evening hosted by Inyathelo on 16 November 2010.
- The SADC High Performance Computing Workshop in February 2011.
- A meeting with the mathematics department at the University of Fort Hare in March 2011.

AIMS Diploma students and lecturers attended a physics lecture in Stellenbosch on Self-Organization and Mechanics of Active Matter in December 2010, and a number of students attended a lecture at the SAAO in January 2011. A number of students participated in a Workshop on discrete mathematics at Stellenbosch University in February 2011 and an Algebra morning in March 2011. Also in March, a group of students and tutors attended part of the SANUM meeting held at Stellenbosch University, and Frances Aron (AIMS English teacher) and AIMS Master's students went to the launch of Campus France.

AIMS-NEXT EINSTEIN INITIATIVE



The past year has seen AIMS-NEI emerge as an independently run project, with the AIMS-NEI Secretariat hiring a number of new staff members and establishing an office a few minutes walk away from AIMS-South Africa. A key achievement has been the recruitment of a number of staff including:

- Executive Director Thierry Zomahoun, who will lead the growth of the AIMS network across the continent
- · Projects Director, Mr Arun Sharma
- Director of Programme Development, Dr Carolina Ödman-Govender,
- · Operations Associate, Trust Chibawara
- · Office Manager, Vicky Mbalo-Ngcwama
- · Financial Controller, Sarah Jackson

The 2010 AIMS-NEI Planning Meeting was held at AIMS-South Africa from 13 to 15 October. This meeting saw representatives from existing and proposed AIMS centres in Ghana, Sénégal, Ethiopia, Nigeria and Botswana come together with members of the AIMS-NEI Board and other supporters.

Recent support for the AIMS network has been provided by a number of universities and companies via the growing One for Many Scholarship programme, and the Universities of Ottawa, Guelph, Waterloo, Victoria, Simon Fraser and Paris-Sud have all joined this programme, as well as the mobile technology company Research In Motion.

The main work of AIMS-NEI is currently focussed on establishing new centres and supporting their startup and operations.

Sénégal:

AIMS-Sénégal is to open its doors in September 2011 to 36 students from 14 countries, 11 of whom are women. A gala opening ceremony will launch the year after which students will undertake a course similar in style and content to the PGD programme offered at AIMS-South Africa. This year's course is highlighted by three Fields Medallists as well as the Founding Director of AIMS-South Africa (Fritz Hahne) and Founder of AIMS (Neil Turok). The AIMS centre in Sénégal is located on the Institut de recherche pour le développement campus at Mbour, about 80km south of Dakar, with student and professor accommodation located adjacent to the classroom facility.

Ghana:

AIMS-Ghana is planning to open in September 2012 at Saltpond and is in the final stages of recruiting its inaugural director. An architectural competition will soon be completed and construction of the purpose-built building is expected to start in 2012. A high-level delegation met with the Vice-President of Ghana who indicated strong support for AIMS-Ghana from President John Evans Atta-Mills and committed to providing \$1.5M USD from the Government towards the construction of the AIMS-Ghana campus. Together with the \$500K USD already provided by Google, this brings the total amount available for construction of the campus to \$2M USD against a budget of \$2.5M USD.



Ethiopia:

Early discussions have been held with the Ethiopian government and Ethiopian universities about the establishment of AIMS-Ethiopia and strong indications of support have emerged. A Project Developer from AIMS-NEI will work closely with a team of Ethiopian and International academics to drive AIMS-Ethiopia forward.

VISITORS TO AIMS

October 2010

Ms Petra-Ruth Mann, International Bureau of the BMBF, coordinator for Southern Africa

Ms Maja Clausen, Counsellor for Research, Science and Technology at the German Embassy in Pretoria Ms Renate Reichardt, Head of Cultural Affairs, German Consulate General in Cape Town

November 2010

Professor Pawel Danielewicz, Michigan State University Ms Cynthia A. Brown, Public Diplomacy Officer, U.S. Consulate General

Professor George Ellis, University of Cape Town
Professor Baumslag, City College of New York
Professor Sr. Rebecca Walo Omana, Department of
Mathematics and Computer Science, Kinshasa, D.R.Congo
Mr Olivier Olela, PhD Student, University of Cape Town
Members of the Department of Mathematics at
Stellenbosch

Mr Edwin Madisha, Senior CSI practitioner, Tshikulula Social Investments

Ms Sonia Schoeman, Stellenbosch Foundation Ms Lucie Edwards, Former Canadian ambassador to South Africa

December 2010

Ms Karen Fonn

Mr Günter Nooke, German Chancellor's Personal Representative for Africa in the Federal Ministry for Economic Cooperation and Development (BMZ) Mr Hans-Werner Bussmann, Consul General of the Federal Republic of Germany in Cape Town

January 2011

Professor Michel Laurent, President of IRD Professor Graeme Hocking, Mathematics and Statistics, M&E, Murdoch University

Professor Jan Nordstrom, Department of Mathematics, Linkoping University

Ms Anneline Morgan, Director, Africa Cooperation, Department of Science and Technology Ms Tugela Mtubatuba, Department of Science and Technology

February 2011

Ms Adele Dion, High Commissioner of Canada to South Africa

Dr Jeffrey Fox, an American Association for the Advancement of Science (AAAS) Science & Technology

March 2011

A delegation from Kennesaw State University led by Dr Ikechukwu Ukeje

Professor Jim McKenzie, University of KwaZulu-Natal Ms Karina Gibson, Corporate Social Responsibility initiatives for RIM and Chris Jones, University Relations Ms Martha Bridgman from Education USA Mr Vincent Baron, Attaché for Science and Technology at the French Embassy

Ms Elzette Mathys, University Cooperation officer at the French Embassy



April 2011

Dame Jocelyn Bell and Dr Shazrene Mohamed Dr Katarina Britz, UKZN CSIR-Meraka Centre for Artificial Intelligence

Ms Sall Ramatoulaye, facilities manager for AIMS-Sénégal

May 2011

Professor Charles McGruder III, Professor Hakeem Oluseyi and Dr Lawrence Norris, National Society of Black Physicists (NSBP http://www.nsbp.org/) in the United States

June 2011

Mr Thierry Zomahoun, consultant for AIMS-NEI Mr Diallo Mamadou, system Administrator for AIMS-Sénégal

Ms Elzette Mathys, University Cooperation Officer, French Embassy in South Africa

Mr Charles Leadbeater, writer, and Mr Romain Starapoli, photographer

July 2011

Professor David Borchers, Centre for Research into Ecological and Environmental Modelling, University of St Andrews

AIMS GOVERNANCE & ADMINISTRATION

Governance

AIMS Trust

The AIMS Trust met on 4 February 2011. The AIMS Trust is a registered charitable trust with tax exemption with the following appointed trustees: Professor Russell Botman, Professor Fritz Hahne, Professor Keith Moffatt, Professor Daya Reddy, Professor Ben Turok, Professor Neil Turok, and Professor Jan van Bever Donker.

AIMS Council

AIMS is governed by a Council which includes representatives of each of the six partner universities. The AIMS Council met on 4 February 2011. Its current members are Professor Jan van Bever Donker (University of the Western Cape), Professor Hendrik Geyer (Stellenbosch University), Professor Daya Reddy (University of Cape Town), Professor Keith Moffatt (University of Cambridge), Professor Graham Richards (University of Oxford), Dr Tsou Sheung Tsun (University of Oxford), Professor Stephane Ouvry (Université de Paris Sud XI), Dr Phillippe Mawoko (NEPAD Office of Science and Technology) with Professor Neil Turok (Perimeter Institute) as Founder and Chair, and the Director of AIMS, Professor Barry Green, as an ex officio member.

AIMS Advisory Board

The AIMS Advisory Board advises on strategic and academic aspects of the AIMS programme, in particular its integration with existing courses and research projects in South African and other African universities. It met on 13 June 2011. Its current members are Professor Edward Lungu (University of Botswana) as Chair, Professor Jacek Banasiak (University of KwaZulu-Natal), Professor Kathy Driver (University of Cape Town), Professor David Fisher (University of the Western Cape), Professor Barry Green (AIMS), Dr Sizwe Mabizela (Rhodes



University), Dr Peter Martinez (South African Institute of Physics), Dr Thandi Mgwebi (NRF), Professor David Sherwell, (University of the Witwatersrand), Dr Sibusiso Sibisi (Council for Scientific and Industrial Research), Professor Hlengani Siweya (South African Mathematical Society) and Professor Arnold van Zyl (Stellenbosch University).

AIMS Executive Team

Professor Francis Benyah (University of the Western Cape), Professor Kristian Müller-Nedebock (Stellenbosch University), and Dr Mark Berman continued to serve on the AIMS Executive Team (AET). Professor Nicola Mulder and Professor Ingrid Rewitzky were invited to serve on the AET during 2011. Members of the AET assist the Chair of the AET, Professor Barry Green, with the selection of students for the PGD and with DAAD applications as well as other tasks identified by the Chair. The AET's additional role is to facilitate the relationship between AIMS and the three participating South African universities.



Staff

Rene January commenced duties as Administrative Officer in the Cosmology research area in the Research Centre at the beginning of May 2011. Tom Bamford joined Jan Groenewald in the IT section during mid-May 2011 as Systems Administrator. Fazley Jattiem, Igsaan Kamalie and Emmanuel Kongolo continued providing support in the Logistics and Facilities division. Deborah Wilsnagh was promoted to Manager: Finance and Human Resources assisted part-time by Liesl Jones. Lynne Teixeira was promoted to Manager: Administration and Research and was assisted by A'eeda Mpofu as well as Liesl Jones and Gudrun Schirge in a part-time capacity. Najwa Chellan and Barrie Barnard continued their fulltime involvement in AIMSSEC and were supported by Tony Beardon, the founder of AIMSSEC, Elizabeth Turok and Sari Smit as part-time lecturers, and Cynthia Fries and Jai Grover as teaching assistants.

Tutors and Lecturers

Visiting lecturers are invited to teach courses on the AIMS' PGD and the Honours programme and AIMS appoints a number of teaching assistants to assist them and the AIMS Director.

During the year under review the following teaching assistants were appointed: Gordon Amoako (Ghana), Mary Fasan (Nigeria), James Ferguson (Canada), Khalid Kheiri (Sudan), Bruno LeFloch (France), Gaston Mazandu (DR Congo), Felix Oghenekohwo (Nigeria), Edgar Otumba (Kenya), and Andry Rabenantoandro (Madagascar).

Frances Aron continued as English Teacher, while Jan Groenewald also taught a number of IT-related courses.







Information Technology

In 2010/2011 the IT department's focus was on maintaining support levels while seeking to fill vacancies. The independent AIMS review in January 2011 praised the IT department's work and acknowledged the need to urgently fill the IT vacancies. Tom Bamford was employed as a Systems Administrator in May 2011.

In the PGD programme, teaching of Ubuntu desktop use, Linux skills, LaTeX for mathematical typesetting, and software customisations for courses using computational software continues. With the help of teaching assistants, this service was extended to the students on the Honours programme, introductions at workshops, and individual support for researchers. Software customisations for researchers included installation of requested software for a wide range of fields: complex analysis, biomathematics, algebraic geometry, polynomial computations, and model checking.

AIMS-NEI staff were assisted with laptop installations, internet and printing facilities, and configuration of AIMS web services. The AIMS-NEI website (www.nexteinstein.org) was migrated to AIMS' Virtual Private Servers at Cape Town-based ISP Frogfoot Networks. When AIMS-NEI was awarded \$2 million of funding by Google's Project 10^100, Google added an announcement below the Google search page in over 40 countries. AIMS' servers were successfully optimised for the expected spike in traffic use and server load caused by being only two clicks from Google's search page.

During this period, AIMS-Sénégal was advised on the hiring of IT staff. The newly appointed IT Manager, Mohamed Lamine Diallo, visited AIMS for six weeks for training and consultation. Work continues on network planning, automated laptop installation, scientific software, Google Apps for Education, and the AIMS-Sénégal website (www.aims-senegal.org).

AIMSSEC's website (aimssec.aims.ac.za) was upgraded in July 2010 to a variation of the Scribbler's Club design of the AIMS website. It was migrated to AIMS' Virtual Private Servers at Frogfoot Networks. An instance of the e-learning platform Moodle was installed for use in AIMSSEC teacher training courses. This was later migrated to AOSIS/ITUTA, the South African official

Moodle Partner, in order to run custom versions of Moodle with a Mobile Phone plugin called Mobile Learning Engine.

Student and alumni laptop installations were streamlined, with complete automation as a future goal. Students were also advised on hardware specifications and able to buy laptops via AIMS.

The AIMS student application database and library catalogue service were migrated to Virtual Private Servers at Frogfoot, including some software improvements and bugfixes.

AIMS IT staff assisted South African Astronomical Observatory (SAAO) IT staff in a migration to an open source IP PBX (Asterisk) at the Cape Town and Sutherland sites. After SAAO encountered similar problems to AIMS with stability and hardware support, training for both teams was organised by inviting VoipMagic to AIMS. This proved very successful with subsequent better hardware choices for ISDN interfacing, re-installation on a stable and secure platform, phone firmware upgrades, and monitoring. Tom Bamford gave a talk to SAAO IT staff on the improvements he made.

Neotel has laid fibre to AIMS, and in August 2011 the internet budget will be increased by 63% yielding a bandwidth increase of 200% under a new pricing structure. This will ease the pressure put on by growth in the Research Centre, increased workshop numbers, and using cloud services. However it is still necessary to pursue SANReN connectivity for AIMS to succeed at expansion of its national interaction with South African academics, researchers, students, and teachers.

Facilities

During the year under review, the following work was undertaken by the facilities department: Replacement of two hot water geysers, renovation of the ground and first-floor bathrooms, and the addition of an entertainment area at the back of the building. A new catering company was appointed in August 2010. The AIMS vehicles now require replacing and the interior of the main building and the tutor residences will need to be repainted during the coming year.

AIMS FINANCIAL REPORTS



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STELLENBOSCH UNIVERSITY AIMS R028

Financial Statement for the year ended 31 December 2010

TOTAL INCOME
Anonymous Arcada Trust
Barcleys PLC
Cerebridge University Press Cenon Cultins
Cyrthia & George Mitchell Foundation
DAAD
Department of Education (2010/11) Department of Science and Technology
Friends of AIMS
Foreign Exchange Profit Foundation Philanthropia
Google (Tides Foundation)
Hand Drum Rhythms
London Mathematical Society Martin Rees (Endowed Scholarship)
Neil Turuk
Royaltes SACIMA
Stellenbosch University
Slephen Hawling (Endowed Scholership)
Sundry Income The Paul G, Allen Family Foundation (Endowed Scholambig)
The Victor Robischild Memorial Fund
Vodecom Workshope
Other Income: Contribution by Projects (Accom.& Admin Feet
Other Income: Contribution by Cost Centre: NRF
Other Income: Interest Received
Accommodation (General Overhead Level
Administration Fees (University of Stellenbosch)
Administration Fees (General Overhead Levy)
Advertising Audio Visual Equipment
Audt Fee
Affiliation, Membership and Subscription Fees Book and periodicals
Building, Building Refumsh Costs, Equipment & Furniture
Burseries Catering
Cleaning and Santation
Computer Materials
Consultation Fees and Services Capital Expenses Computer Equipment
Consumable Materials
Copying and Printing Courses
Flowers and Gifts
Foreign Exchange Loss
General Office Expenses Insurance
Internal Transfer of Funds:
Internet Expenses Maintenance of Equipment
Medical Expenses
Muncipal Expenses: Electricity Rates, Refuse, Water
Photographic Materials Postage
Remuneration
Rent of Equipment Repairs & Mointenance
Repatriation costs (students)
Security Services Smaller Furniture & Equipment
Stationery
Student Stipends
Telephone and Cell Phone Costs Travel Expenses
Capital Expenses : Furniture and Equipment
Building Maintenance Receive Fund
Computer / Equipment Replacement Reserve Fund NET INCOME OVER EXPENDITURE
ACCUMULATED FUNDS AT 1 JANUARY 2010
FUNDS AVAILABLE AT 31 December 2019

IOIAL	GENERAL OVERHEAD COSTS	PGD PROGRAMME BURSARIES	ACADEMIC PROGRAMME	POST AIMS BURSARIES	HONOURS PROGRAMME BURSARIES	RESEARCH PROGRAMME	ENDOWED SCHOLARSHIPS	NEXT ENSTEN INITIATIVE & AMINET	PRIOR YEAR 31/12/2009
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Notes to the financial statement for AIMS (Cost Centre R028) for the year ended 31 December 2010

These financial statements are official documents of Stellenbosch University which provides financial administration services to AIMS.

Income

- The donation from Cambridge University Press contributes towards 4 diploma student bursaries.
- 2. The donations received from Canon Collins contributes towards 1 student bursary.
- 3. The funds received from the Department of Science and Technology cover:
- 3.1. A grant for African tutors and researchers.
- 3.2. A contribution to core funding.
- Funds received from Friends of AIMS are donations received from visiting lecturers at AIMS who have opted to donate their honoraria.
- 5. The donation received from Fondation Philanthropia covers 1 student bursary.
- Funds received from the Tides Foundation (Google) cover general support, diploma student bursaries and half-bursaries for Post AIMS Studies.
- Grant received from London Mathematical Society contributes towards travel costs for African students who attended the AIMS diploma programme in 2008-09 and 2009-10.
- The donations received from Avery Tsui Foundation, Peter Kellner and Neil Turok which have been endowed and called the Stephen Hawking and Martin Rees Endowed Scholarships respectively, provides AIMS with 2 diploma student bursaries per annum.
- An endowed scholarship received from The Paul G Allen Foundation provides AIMS with 1 diploma student bursary per annum.
- 10. The donation received from the Victor Rothschild Foundation is for 2 diploma student bursaries.

Expenses

- All expenses shown for 2010 refer to actual costs directly attributable to the relevant AIMS Projects, as detailed on the financial statement.
- Accommodation costs refer to costs for students, lecturers, tutors residing at 6 Melrose Road and 16 Watson Street for the duration of the academic year and for visiting researchers residing at 14 Watson Street during the year under review. These costs include, municipal services, repairs and maintenance to buildings and insurance which were previously shown as separate expenditure items under each project.
- 3. Administration Costs includes general administration and other general expenses of the institution, departmental administration, sponsored projects administration, student administration and services which includes affiliation costs, computer materials costs, consumables, general office costs, staff costs, telephone costs etc. previously shown as separate expenditure items.
- 4. Bursaries and stipendia, staff remuneration, meals for students, conferences and visitors, and travel costs (students and lecturers) comprise the largest portion of the expenses.
- 5. Computer/Equipment Replacement Reserve Fund and Building Maintenance Reserve Fund are reserves based on budgetary projections on expenditures for the replacement of computers and equipment and the maintenance and replacement of property components over a 3 to 5 year period.

Balance

As per the Financial Statement for the year ended 31 December 2009, accumulated funds include earmarked funds as listed. Any project shortfalls are taken from existing funds available.



AIMS RESEARCH CENTRE (27798)

Financial Statement for the year ended 31 December 2010

	31/12/2010	31/12/2009
Income	R 4 395 532.17	R 3 927 412.87
NRF	R 4 000 000.00	R 3 600 000.00
Interest received	R 394 238.00	R 327 403.04
Foreign Exchange Profit	R 1 294.17	R 9.83
Evanges	R 3 621 521.33	R 1 697 150.42
Accommodation and catering	R 330 354.25	R 252 032.51
**************************************	R 6 829.00	R 252 052.51
Affiliation and Registration Expenses	R 600.00	R 50 357.80
Audio Visual Expenditure Bursaries	R 527 256.60	R 363 988.53
Consultation Fees	R 363 967.50	R 102 501.99
Consumables	R 28 559.48	R 15 376.88
	R 132 415.86	R 350 453.42
Furniture & equipment	R 1 295.00	R 684.00
General Office Expenses Internet	R 83 100.00	R 0.00
Medical Expenses	R 39 194.00	R 22 400.00
Printing and Stationery	R 23 790.81	R 40 315.08
Remuneration	R 1 461 015.81	R 193 153.81
Rent of premises	R 120 000.00	K 195 155.01
Student Stipends	R 27 000.00	R 19 600.00
Travel Expenses	R 476 143.02	R 286 286.40
NET SURPLUS	R 774 010.84	R 2 230 262.45
ACCUMULATED FUNDS AT 1 JANUARY 2010	R 5 830 262.45	R 3 600 000.00
EXPECTED FUNDS AVAILABLE AT 31 DECEMBER 2010	R 6 604 273.29	R 5 830 262.45

Ms F Majiet

Deputy Director: Financial Services

Notes to the financial statement for the AIMS RESEARCH CENTRE (Cost Centre 27798) for the year ended 31 December 2010:

- Accommodation and catering costs refer to costs for visiting researchers, postdoctoral fellows, Doctoral and Master's students residing at 14 Watson Street, Muizenberg, during the year under review.
- 2. Bursary costs include bursaries paid to postdoctoral fellows, Doctoral and Master's students.
- 3. Furniture and equipment includes the further acquisition of desks, chairs, computers and cubicles in order to accommodate an increase in researchers, visiting researchers and students at the Research Centre.
- Medical expenses refer to medical costs for post doctoral fellows, Doctoral and Master's students and visiting researchers for the duration of their stay at AIMS.
- 5. Salary costs and consultation fees include salaries for resident and senior researchers, part costs for Programme Co-ordinator, Administrative Officer and honorarium stipends to visiting researchers not covered by grant received from the Department of Science and Technology.
- 6. Student stipends refer to stipends paid to MSc students.



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Financial Statement for the year ended 31 December 2010

	31/12/2010	31/12/2009
	R	R
INCOME	1 445 955.06	1 001 716.74
Donations		
Aga Khan Education Services	8 000.00	
Anonymous	11 922.21	
Christ Church, Oxford	2 715.81	
Churchill College, Cambridge	1 086.33	
Claire Hall, Cambridge	9 994.19	
Datatec Education and Technology Trust	200 000.00	
Education without Borders		40 000.00
Emmanuel College, Cambridge	1 086.33	West Special
Girton College, Cambridge	2 178.94	
Kings College, Cambridge	2 581.98	
Magdalene College, Cambridge	2 065.57	
May and Stanley Smith Charitable Trust	172 917.60	
Michaelhouse	4 300.00	
Nuffield College, Oxford	3 098.37	
Oriel College, Cambridge	516.40	
Sankhyaa Ltd	29 679.22	
Sidney Sussex College, Cambridge	1 194.96	
St Catherine's College, Cambridge	2 191.40	1 0
St John's College, Cambridge	10 768.00	14 490.60
St John's College, Oxford	2 715.81	14 450,00
Trinity Hall, Cambridge	2 581.98	
Victor Rothschild Memorial Fund	133 440.00	332 472.10
Zenex Foundation	283 280.00	332 472.10
. <u> </u>		02.744.00
Other Income: Sundry	3 177.45	63 741.68
Department of Education: Eastern Cape	290 475,00	307 027.00
Department of Education: Kwazulu Natal	120 700.00	32 400.00
IMSTUS	126 440.00	191 607.44
Foreign Exchange Profit	52.76	1 282.46
interest Received	16 794.75	18 695.46
EXPENDITURE	1 304 747.41	1 057 557.95
Advertising	1 363.77	4 275.00
Accommodation and Catering	366 197.05	244 853.81
Affilliation and Registration Fees	280.00	400.00
Books	3 479.10	-
Bursaries	21 072.00	· · · · · · · · · · · · · · · ·
Consultation Fees and Services	9 076.00	13 000.00
Foreign Exchange Loss	746.13	494.99
General Office Expenses	14 939.68	16 948,11
T Services	64 550.00	
Postage	9.0	1 197.65
Remuneration	437 919.59	348 236,49
Services	2.1	1 998.00
Printing and Stationery	33 190.34	17 018.44
Telephone and SMS		1 197.00
Travel Expenses	351 933.75	407 938.46
NET INCOME OVER EXPENDITURE	141 207.65	-55 841.21
ACCUMULATED FUNDS AT 1 JANUARY 2010	167 689.93	223 531.14
FUNDS AVAILABLE AT 31 DECEMBER 2010	308 897.58	167 689.93
SIGNED: JUGOF	200 001.00	101 000,00

Ms F Majlet

Deputy Director: Financial Services

SUPPORTERS

AIMS continues to receive support from a wide range of donors. The Department of Higher Education and Training renewed its three-year grant in support of the PGD programme, and AIMS welcomed the Government of Canada and Research In Motion as new donors through the AIMS-NEI. Besides the larger donors listed below, many lecturers and individuals provide support in the form of smaller online donations, and contributions of books, expertise and time. We are extremely grateful to all.

Current donors

- Department of Higher Education and Training, South Africa
- · Department of Science and Technology, South Africa
- Google Inc. Charitable Giving Fund of Tides Foundation
- Government of Canada (through the AIMS-Next Einstein Initiative)
- · Paul G. Allen Family Foundation
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- · National Research Foundation
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- Cambridge University Press
- · Canon Collins Educational Trust for Southern Africa
- The Victor Rothschild Memorial Fund
- Peter Kellner
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- DAAD
- · The Muizenberg Millenium Education Trust
- Stellenbosch University
- · Professor Neil Turok

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- Jussi Westergren
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- Nokia
- Isle of Man Overseas Aid Committee
- Cynthia and George Mitchell Foundation
- Sheridan Lorenz

- The David and Elaine Potter Charitable Foundation
- The International Council of Scientific Unions (ICSU), with UNESCO and the US State Department
- ICIAM
- Institute of Physics
- The International Union of Theoretical and Applied Mechanics (IUTAM)
- · Vodacom Foundation, South Africa
- Scribblers' Club Borderless Media Strategies
- · Seardel Investment Corporation Limited, South Africa
- · Cheryl Grunbock and Martin King
- The University of Cambridge Local Examinations Syndicate
- The Daniel lagolnitzer Foundation (Fondation De France)
- New Star Asset Management
- The Go Open Source Campaign
- SUN Microsystems
- · Hyper-Interactive Teaching Technology
- The Ellison Medical Foundation
- Fred Turok
- Hand Drum Rhythms, Victoria BC
- Gagan Garg
- Professor Jonathan Webb, University of Cape Town (book donation)
- Professor Brian Abrahamson, Flinders University, Australia (book donation)
- AIMS Lecturers: Paul Hewson, Jane Hutton, Sergei Pond. Praseniit Saha
- Stella Innes, for the donation of the remarkable mathematical research library of her late husband, Evan Innes
- · British Airways, South Africa Office
- Chicago State University
- European Mathematical Society Committee for Developing Countries
- Jonathan Leake, Sunday Times

AIMSSEC is grateful to its sponsors for supporting its programmes. The following sponsors donated more than R30 000:

Datatec Educational and Technology Trust Rand Merchant Bank Fund Department of Education: Eastern Cape Sankhyaa Learning Private Limited (HeyMath!) Department of Education: KwaZulu-Natal Victor Rothschild Memorial Fund May & Stanley Smith Charitable Trust Zenex Foundation





FUTURE PLANS

AIMS has established itself as a leading centre for the mathematical sciences in South Africa. Its Postgraduate Academic Programme, young Research Centre, Schools Enrichment Centre and conference activities attract over 350 local and international visitors to our institute each year, a figure which does not include our student component. AIMS has also become a centre of choice for hosting workshops and conferences in the mathematical sciences. Meetings range from highly specialised topics to practitioner orientated sessions.

Building on this good track record, AIMS will be introducing new programmes including a second intake for the Postgraduate Diploma, and this will require the expansion of our facilities.

This year following the approval of exemption of the AIMS Trust from Taxes and Duties by the South African Revenue Service, the main building at 6 Melrose Road was most generously transferred to AIMS by the Muizenberg Millenium Educational Trust, chaired by Professor Ben Turok. We are now positioned to expand our facility and are confident that with careful planning and the support of many who have helped us to make AIMS a special place we will achieve this goal.

AIMS is noted for its spirit of hope and its contribution to scientific growth and development in Africa, a mission we are proud to work towards.





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