

$$L(x, \lambda, \nu; z) = f(x) + \lambda^2 \nu(x) + \nu^2 (g(x) - z^2) + \frac{1}{2\mu} \| \nu(x) \|^2 + \frac{1}{2\mu} \| \nu(x) - z^2 \|^2$$



$$\lim_{x \rightarrow \infty} \frac{1}{(2\pi)^{\frac{1}{2}}} \int_{-\frac{x}{\sqrt{t}}}{\frac{x}{\sqrt{t}}} \exp\left\{-\frac{z^2}{2}\right\} dz = 0$$

$$\left\{ \frac{z^2}{2} \right\} dz = 0$$



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$$\left(\frac{e^n n!}{n^n \sqrt{n}} \right) \sum_{n=0}^{\infty} C^{-2n}$$

African Institute for Mathematical Sciences

Foreword by the Director

Each of the first six years of operation of AIMS has brought growth, development and excitement with it. Following the launch of the new research centre in May 2008, AIMS has this year been able to structure the research programme in the specific areas. Funding from the South African Department of Science and Technology (through the NRF) commenced in January 2009, and the centre is now developing vigorously. AIMS has already established activities in Biomathematics and in Mathematical Finance, resident researchers are being appointed, and a number of post-docs and masters students have been accepted in to the Research Centre.

The Postgraduate Diploma (PGD) Programme is well established as the backbone of our operations. It is encouraging to note that the number of student applicants for the 2009/10 programme has increased yet again and that the standard of applicants remains high. We continue to make efforts to increase the number of South African students attending the programme, for example through the new BSc (Honours) course in Biomathematics, established this year in partnership with Stellenbosch University. Five South African students were enrolled for the Biomathematics Honours programme in 2009. Sections of it were also followed by students from the PGD programme. It thus enriched this focus area of Biomathematics. The intention is to continue with this honours programme. Apart from the contribution it makes to capacity building in this area, the programme also serves as an example for similar programmes in other areas, for instance, Mathematical Finance.

All the PGD students completed their studies successfully and most of them have already found interesting courses and places for further study. For those who enrolled at South African universities in approved research masters programmes, AIMS was able to provide partial support from funds raised for this purpose.

The graduation was yet again a colourful event with all three local universities participating fully. Dr Cheryl de la Rey presented the main address. For the first time four new, named, endowed scholarships were awarded: the Paul G. Allen, Stephen Hawking, Martin Rees and Victor Rothschild Scholarships.

As far as facilities are concerned, the main AIMS building was repainted and partially refurbished, most of the old computers were replaced and additional ones were acquired. Possession was taken of the St Claire house in Watson Street which serves as accommodation for visiting researchers and research students. Even though vacant office space is still available in the research centre, this is filling up quickly and it is clear that AIMS will need additional buildings or major extensions to the present main building quite soon.

The staff at AIMS has again been committed to its efficient operation. New members were appointed to the IT section (Alfred Tswinyane Mahlangu), in the Administration (Deborah Wilsnagh and Liesl Jones) and in AIMSSEC (Barrie Barnard).

Currently, the financial situation is sound. However, the international financial crisis has had an effect on donations. This may become a matter of concern in the months to come. Careful management continues to be paramount.

AIMS acts as the Secretariat for the AIMS Next Einstein Initiative (AIMS-NEI). A team from McKinsey was hosted at AIMS where they assisted with the preparation of the AIMS-NEI overview document. Marie-Pierre Barre and Dr John Mugabe, who are consultants for AIMS-NEI, were also hosted at AIMS on several occasions.

Many supporters have given their time as lecturers, supervisors, and tutors to AIMS, and many individuals and organisations have given substantial financial support. We express our gratitude to all and we hope that they share in our pride for what has been achieved.

Fritz Hahne - Director



Introduction

AIMS is a tertiary level institution specialising in postgraduate training and research in the mathematical sciences. Located in Muizenberg, Cape Town, the Institute is a collaborative effort of six universities which are all represented on the AIMS Council:

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

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.

This report covers the activities of the African Institute for Mathematical Sciences for the academic year 2008- 2009. It includes financial reports for the 2008 calendar year, provided by Stellenbosch University, which provides administrative, human resource and financial services as a contribution in kind to the AIMS project.

Postgraduate Diploma in the Mathematical Sciences

The Postgraduate Diploma in the Mathematical Sciences was the first programme initiated at AIMS in 2003, with the goal of helping to build a community of strong, independent mathematical scientists in Africa. The Diploma is multi-disciplinary in scope, and accredited at masters level by the three local universities.

The students who enrol at AIMS, are registered for the Diploma at the University of Cape Town, University of the Western Cape and Stellenbosch University. They have access to library facilities on all campuses, and all three universities officiate at the year-end graduation ceremony. AIMS provides a good example of collaboration between three local universities, which are all able to share in its successes.

The Diploma programme is unique in its approach and content. Not only does it build core mathematical skills common to all of modern science, it also introduces students to cutting edge scientific topics relevant to development in Africa. The essay phase of the programme provides the students with research and report writing skills necessary for a career in research. The teaching style emphasises problem solving through discussion and group work, and has a noticeably high level of student-lecturer interaction. The course is now internationally recognised as a model for postgraduate teaching.

Progress to date

The number of applications for the Diploma Programme increases each year, with AIMS receiving 267 applications for the 2008-9 academic year. Fifty students were invited to participate in the diploma programme, and forty-two students from nineteen different countries finally enrolled at AIMS in August 2008. This group included sixteen women - the highest proportion of women on the course to date. AIMS has received 304 applications for the 2009-10 Diploma programme, including 49 applications from women.





A breakdown of the 2008-9 PGD students by country of origin can be found below:

Country	No. of Students	Male	Female
Central African Republic	1	1	0
Republic of Congo	4	3	1
Cameroon	3	1	2
Ethiopia	3	3	0
Ghana	1	1	0
Kenya	1	0	1
Lesotho	1	1	0
Madagascar	5	2	3
Malawi	1	1	0
Niger	1	1	0
Nigeria	7	4	3
Rwanda	2	0	2
Sudan	4	3	1
Togo	1	0	1
Tanzania	3	2	1
Uganda	1	1	0
South Africa	1	1	0
Zambia	1	1	0
Zimbabwe	1	0	1
19	42	26	16

In addition to the PGD students listed above, five South African students attended the new Biomathematics Honours course, run in conjunction with Stellenbosch University. It is hoped that this number will grow in coming years as the course gains visibility. AIMS embarked on a recruitment drive to attract South African students. Director Fritz Hahne, visited a number of South African universities, addressing staff and students at these institutions. In partnership with the South African Centre for Epidemiological

Modelling and Analysis (SACEMA), AIMS ran a fully sponsored short course for South African students during the midyear break. The course, which was held in 2008 and 2009, focuses on Mathematics in Biology.



The academic programme

The Postgraduate Diploma programme runs from August to June each year. It is divided into three semesters: the skills courses, the review courses and the essay phase. Lecturers register on to

the AIMS database, and may then propose suitable courses when AIMS calls for these each year. AIMS encourages international lecturers to co-teach alongside South African lecturers.

Skills courses 2008-9

Time period	Contact hours	Lecturer(s)	Course Title
25 Aug - 29 Aug	18	Jan Groenewald, AIMS	Introduction to AIMS computing facilities and LaTeX
25 Aug - 29 Aug	18	Frances Aron, AIMS	English Essentials
1 Sept - 10 Oct	18	Frances Aron, AIMS	Communication Skills
1 Sept - 27 Sept	30	Jordi Campos Miralles, Barcelona, Jesus Cerquides, Barcelona & Jan Groenewald, AIMS	Software Development using Python
1 Sept - 19 Sept	30	Alan Beardon, Cambridge	Mathematical Problem Solving
29 Sept - 10 Oct	30	Babatunde Ogunnaike, Delaware	Probability and Statistics
13 Oct - 31 Oct	30	Alan McFarlane, Cambridge	Mathematical Methods
13 Oct - 31 Oct	30	David Aschman & Roger Fearick, UCT	Physical Problem Solving
10 Nov - 28 Nov	30	Bernd Schroers, Herriot Watt	Ordinary Differential Equations
10 Nov - 28 Nov	30	Robert De Mello Koch, WITS	Electromagnetism



Review courses 2008-9

Time period	Contact hours	Lecturer(s)	Course Title
1 Dec - 19 Dec	30	Jane Hutton, Warwick Rebecca Shanmugam, Durban	Analysis of Lifetime Data
1 Dec - 19 Dec	30	Seid Mohammed, Addis Ababa	Real Analysis
1 Dec - 19 Dec	30	Rafael Nepomechie, University of Miami	Quantum Mechanics & Quantum Spin Chains
5 Jan - 23 Jan	30	Patrick Dorey, Durham	Solitons
5 Jan - 23 Jan	30	Jeff Sanders, United Nations, Macao	What is Computer Science?
5 Jan - 23 Jan	30	Vincent Rivasseau, Paris Sud XI	Advanced Real & Complex Analysis
26 Jan - 13 Feb	30	Maciej Capinski, Krakow	Mathematical Tools for Corporate Finance
26 Jan - 13 Feb	30	Marshall Hampton, Minnesota	Bioinformatics Algorithms in Sequences Analysis
26 Jan - 13 Feb	30	Stephan Wagner, Stellenbosch & Clemens Heuberger, Graz	Graph Theory
23 Feb - 13 Mar	30	Prasenjit Saha, Zurich	Astrophysics
23 Feb - 13 Mar	30	Hans George Rück, Kassel & Barry Green, Stellenbosch	Finite Fields & Applications
23 Feb - 13 Mar	30	Jan Govaerts, Louvain-la-Neuve	Quantum Physics & Relativistic Quantum Field Theory
16 Mar - 3 Apr	30	Delfim Torres, Aveiro	Variational Calculus & Optimal Control
16 Mar - 3 Apr	30	Paul Milewski, Wisconsin & Andre Weideman, Stellenbosch	Waves in Fluids
16 Mar - 3 Apr	30	Colm Caulfield, Cambridge	Fluid Dynamics



Essay phase and examinations

During the third semester, students are required to write a research essay on a topic of their interest. A wide range of suitable topics are proposed by local and international academics. The students wrote and completed their essays over seven weeks, with assistance from their supervisors, tutors, and the AIMS English teacher, Frances Aron. The students then presented and defended their essays in front of a panel of examiners which included:

- the essay supervisor
- an external examiner
- the student's tutor
- the AIMS Director, Fritz Hahne

This year the external examiners were:

- Dirk Laurie, Retired Professor of Mathematics, Stellenbosch University
- Gerhard Goldenhuys, Retired Professor in Applied Mathematics, Stellenbosch University
- Erich Friedland, Retired Professor of Physics, University of Pretoria
- Pieter Maritz, Retired Professor of Mathematics, Stellenbosch University.

The list of students, their selected topics and their supervisors are listed below and continued on page 8.

Student	Country	Topic	Supervisor	University/Institute
Abdelrhman Yousif Mohammed Ahmed Yousif	Sudan	Propagation of ultrashort laser pulses through a linear medium	Heinrich Schwoerer	Stellenbosch University
Abiy Dejene Zeleke	Ethiopia	Modelling the joint HIV/TB epidemics	Rachid Ouifki	SACEMA
Adeleke Olusegun Bankole	Nigeria	Thermal Decomposition in 1D Shear Flow of Generalized Newtonian liquids	Tirivanhu Chinyoka	University of Cape Town
Ari Juvet Kaya	Republic of Congo	Measurement and analysis of ultrashort light pulses by means of a second harmonics autocorrelator	Heinrich Schwoerer	Stellenbosch University
Asha Saidi Kalula	Tanzania	Modelling early tumor growth with diffusion equation	Jacek Banasiak	University of Kwazulu-Natal
Brian Chilambwe	Zambia	Pricing Bivariate Options using Copulas	Peter Ouwehand	Stellenbosch University
Chidinma Agbawo	Nigeria	Monte Carlo Methods for Pricing American Options	Peter Ouwehand	Stellenbosch University
Christine Ayawoa Sitsope Dagbovie	Togo	Functional graph algorithms / 2009-04-06	Jeff Sanders	United Nations University
Colette Niyitegeka	Rwanda	Lie-Algebraic Approach for Pricing Financial Derivatives	Raouf Ghomrasi	AIMS
Elimboto Mwiki Yohana	Tanzania	Computability on Convex Sets	Vasco Brattka	University of Cape Town
Elisa Josiane Rindrahariasona	Madagascar	Mathematical methodologies in the block modeling of horizontal crustal motions	Christopher Hartnady & Eric Calais	Umvoto Africa and Purdue University
Epiphane Patricia Dzoussi Boukama	Republic of Congo	GPS geodetic and radar data-processing	Christopher Hartnady	Umvoto Africa
Eric Ould Dadah Andriantiana	Madagascar	Kuratowski's Theorem	Stephan Wagner	Stellenbosch University
Esther Nkiruka Orisakwe	Nigeria	The physics of molecular motors II	Kristian Mueller-Nedebock	Stellenbosch University
Faniry Harijaona Razafindrazaka	Madagascar	Computational Geometry	Jeff Sanders	United Nations University
Friday Ifeanyi Michael	Nigeria	Subtractive and additive categories	Zurab Janelidze	Stellenbosch University
Geoffrey Wingi Sikazwe	Tanzania	The potential impact of microbicides and condoms in reducing HIV	Farai Nyabadza	Stellenbosch University
Henintsoa Onivola Minoarivelo	Madagascar	Distributed decision making and optimization	Jesus Cerquides	University of Barcelona
Hussam Eldeen Babikir Ahmed Mohammed	Sudan	Nuclear clusters & incomplete fusion reactions	Simon Mullins and David Aschman	iThimba Labs and University of Cape Town

Student	Country	Topic	Supervisor	University/Institute
Jacob Mohau Mateyisi	Lesotho	The physics of molecular motors I	Kristian Mueller-nedebock	Stellenbosch University
Jean Oscar Honda Malawa	Republic of Congo	Laser spectroscopy I	Eric G Rohwer	Stellenbosch University
Josephine Elama Ameh	Nigeria	Basic Reproductive Ratio: Stability and Bifurcation	Rachid Ouifki	SACEMA
Kwame Oppong Hackman	Ghana	Distributed decision making and optimization	Jesus Cerquides	University of Barcelona
Lydienne Matchie	Cameroon	Mallavin Calculus and some applications in finance	Raouf Ghomrasni	AIMS
Marie Chantal Cyulinyana	Rwanda	Review and improvement possibilities of heat storage	Phillipe Ferrer	University of the Witwatersrand
Martial Didier Yangoufelo Malessabo	CAR	Optimal Stopping and the Pricing of American Claims	Peter Ouwehand	Stellenbosch University
Michael Oyesola Okelola	Nigeria	Asymmetric Information and the Bid-Ask Spread	Raouf Ghomrasni	AIMS
Mohamed Elbasher Ahmed Elbasher	Sudan	Representation of Barriers to Fusion of Heavy Nuclei	Simon Mullins and David Aschman	iThemba Labs and University of Cape Town
Nathan Muyinda	Uganda	Application of finite fields to cryptography & data security	Barry Green and Hans Georg Rueck	Stellenbosch University & Kassel University
Nicole Flaure Kouemo Tchamga	Cameroon	Fourier Transform methods in Option Pricing	Peter Ouwehand	Stellenbosch University
Olina Ngwenya	Zimbabwe	On the role of incidence functions in an SEIR model	Abba Gumel & Farai Nyabadza	University of Manitoba and SACEMA
Olubode Caleb Adetunji	Nigeria	Deconvolution	George Smith	University of Cape Town
Patrick Biyason Phepa	Malawi	HIV-1 latent reservoir and intermittent viral blips	Aziz Ouhinou	AIMS
Ralison Bodoharimefy Holinatoandro	Madagascar	C ₀ -Semigroups approach for linear evolution equations	Aziz Ouhinou	AIMS
Salha Mamane	Niger	Local Time and the Equity Portfolios Generated by Functions of Ranked Market Weights	Raouf Ghomrasni	AIMS
Simon Peter Johnstone-Robertson	South Africa	Analysis of the benefits and costs of safe medical male circumcision as a method of reducing HIV incidence	John Hargrove	SACEMA
Tabitha Elisabeth Gathoni Mundia	Kenya	Potential Role of Multiobjective Optimization Methods for water Resources Planning in Kenya	Theodor J Stewart	University of Cape Town
Victor Nzengang Feunou	Cameroon	Global optimization via semidefinite programming	Montaz Ali	ZA / University of the Witwatersrand
Wilfrid Innocent Ndebeka	Republic of Congo	Laser Spectroscopy II	Eric G Rohwer	Stellenbosch University
Yibeltal Negussie Bayleyegn	Ethiopia	Mathematical Analysis of a Model for Cholera Transmission Dynamics	Abba Gumel & Aziz Ouhinou	University of Manitoba & AIMS
Zeinab Gasmelseed Mohammed	Sudan	The Relative Biological Effectiveness of p66 Be Neutrons in Human T Lymphocytes	J.P Slabbert	iThemba Labs
Zelalem Aynabeba Berihun	Ethiopia	Non-linear incidence and the dynamic of infectious disease models	Aziz Ouhinou	AIMS

Graduation

All forty-two Diploma students graduated on 25 June at a special ceremony held at the Muizenberg Pavilion. The ceremony was addressed by the Kenyan High Commissioner to the Republic of South Africa, His Excellency Mr T Amolo. The vice-chancellors or deputy vice-chancellors of all three local universities officiated the conferring of the Diplomas for their respective students. Dr Cheryl de la Rey, CEO of the Council for Higher Education, gave the main address. The students and guests enjoyed a buffet luncheon and lively marimba music.

Presentations of the AIMS endowed scholarship awards for 2008-9 were made at the graduation ceremony. The scholarships were awarded as follows:

Mr Eric Ould Dadah Andriantiana
Stephen Hawking Scholarship

Mr Victor Nzengang Feunou
Martin Rees Scholarship

Mr Faniry Harijaona Razafindrakazaka
Paul G. Allen Family Scholarship

Ms Lydienne Matchie
AIMS Victor Rothschild Scholarship





Extra curricular activities

A number of students attended the SANUM conference held in Stellenbosch from 6 to 8 April. AIMS students were also able to attend the workshops held at AIMS during the course of the year. These included the Financial Mathematics workshop, the Biomathematics workshop, and the AIMS/SACEMA/DIMACS Data Modelling clinic.

Other cultural events

- trip to the Castle of Good Hope
- tour of the Timbuktu scroll exhibition at Iziko Museum
- visit to Iziko Museum on the commemoration of the 1808 Cape Slave Revolt
- attendance of the official opening of the Iziko Museums Summer School Programme
- trip to Llundudno and Lion's Head
- small group to outdoor Shakespearean theatre
- attendance of the Stellenbosch University's International Office gala evening on 25 August
- participation in the Africa University Day celebrations in Stellenbosch on 12 November
- participation in the African country theme evenings held during the year at AIMS.



Alumni

The graduation of 42 students from the Diploma programme in June 2008 brought the total number of AIMS graduates to 252. Each year at least 90% of AIMS graduates proceed to degree

programmes at top South African or international universities. The tables on pages 10 and 11 illustrate the progress of graduates from 2008 and 2009.

2008 - 2009 Students	Gender	Country of Origin	Destination	Programme
Adetunji, Olubode Caleb	Male	Nigeria	University of Cape Town	Masters
Agbawo, Chidinma	Female	Nigeria	Stellenbosch University	Masters
Ameh, Josephine Elama	Female	Nigeria	SACEMA/Stellenbosch University	Masters
Andriantiana, Eric Ould Dadah	Male	Madagascar	Stellenbosch University	Masters
Bankole, Adeleke Olusegun	Male	Nigeria	Erasmus Mundus	Masters
Bayleyegn, Yibeltal Negussie	Male	Ethiopia	AIMS	Masters
Berihun, Zelalem Aynabeba	Male	Ethiopia	University of Kwazulu Natal	Masters
Chilambwe, Brian	Male	Zambia	University of Kwazulu Natal	Masters
Cyulinyana, Marie Chantal	Female	Rwanda	University of the Witwatersrand	Masters
Dagbovie, Ayawoa Sitsope	Female	Togo	Herriot Watt University	Masters
Dzoussi Boukama, Epiphane Patricia	Female	Republic of Congo	University of Kwazulu Natal	Masters
Elbasher, Mohamed Elbasher Ahmed	Male	Sudan	Stellenbosch University	Masters
Feunou, Victor Nzengang	Male	Cameroon	Berlin Mathematical School	Masters
Gasmelseed Mohammed, Zeinab	Female	Sudan	University of Khartoum	Masters
Hackman, Kwame Oppong	Male	Ghana	Rensselaer Polytechnic Institute	Masters
Honda Malawa, Jean Oscar	Male	Republic of Congo	Louvain-la-Neuve, Belgium	Masters
Johnstone-robertson, Simon Peter	Male	South Africa	SACEMA	Masters
Kalula, Asha Saidi	Female	Tanzania	SACEMA	Masters
Kaya, Arli Juvet	Male	Republic of Congo	Erasmus Mundus	Masters
Kouemo Tchamga, Nicole Flaure	Female	Cameroon	AIMS	Masters
Mamane, Salha	Male	Niger	University of Niamey	Masters
Matchie, Lydienne	Female	Cameroon	AIMS	Masters
Mateysi, Jacob Mohau	Male	Lesotho	Stellenbosch University	Masters
Michael, Friday Ifeanyi	Male	Nigeria	Stellenbosch University	Masters
Minoarivelo, Henintsoa Onivola	Female	Madagascar	Stellenbosch University	Masters
Mohammed, Hussam Eldeen Babikir Ahmed	Male	Sudan	University of Cape Town	Masters
Mundia, Tabitha Elisabeth Gathoni	Female	Kenya	University of Cape Town	Masters
Muyinda, Nathan	Male	Uganda	Stellenbosch University	Masters
Ndebeka, Wilfrid Innocent	Male	Republic of Congo	Stellenbosch University	Masters
Ngwenya, Olina	Female	Zimbabwe	SACEMA/UKZN	Masters
Niyitegeka, Colette	Female	Rwanda	Erasmus Mundus	Masters
Okelola, Micheal Oyesola	Male	Nigeria	University of Kwazulu Natal	Masters
Orisakwe, Esther Nkiruka	Female	Nigeria	University of the Witwatersrand	Masters
Phepa, Patrick Biyason	Male	Malawi	SACEMA	Masters
Ralison Bodoharimefy Holinatoandro	Female	Madagascar		
Razafindrazaka, Faniry Harijaona	Male	Madagascar	BMS, Berlin	Masters
Rindraharisaona, Elisa Josiane	Female	Madagascar	ICTP, Trieste	Masters
Sikazwe, Geoffrey Wingi	Male	Tanzania	ICTP, Trieste	Masters
Yangoufola Malessabo, Martial Didier	Male	Central African Republic	Louvain-la-Neuve, Belgium	Masters
Yohana, Elimboto Mwiki	Male	Tanzania		
Yousif, Abdelrhman Yousif Mohammed Ahmed	Male	Sudan	Louvain-la-Neuve, Belgium	Masters
Zelege, Abiy Dejene	Male	Ethiopia	University of Kaiserslautern, Germany	PhD

**2007-08
Students**
Gender Country of Origin Destination Programme

2007-08 Students	Gender	Country of Origin	Destination	Programme
Abass, Sara Abdelazeem Hassan	Female	Sudan	University of Cape Town	Masters
Abdulra'uf Bello, Bilkisu	Female	Nigeria	SACEMA	Masters
Ahmed, Eltayeb Elbushra	Male	Sudan	University of Khartoum	Lecturer
Ali, Zakaria	Male	Chad	University of Pretoria	Masters
Amadi, Blessing	Female	Nigeria	Erasmus Mundus	Masters
Ayivor, Audry Fafa Abia	Female	Ghana	University of Cape Town	Masters
Banagaaya, Nicodemus	Male	Uganda	Johannes Kepler University Linz, Austria	Masters
Biatat, Viani Aime	Male	Cameroon	Herriot Watt University, Edinburgh	PhD
Chibawara, Trust	Male	Zimbabwe	University of Stellenbosch	Masters
Chimusa, Rukamika Emile	Male	DRC	University of the Cape Town	Masters
Degaga, Eleni Kinfe	Female	Ethiopia	Syracuse University, New York	PhD
Djoufedie, George Noel	Male	Cameroon	Erasmus Mundus	Masters
Dushimimana, Jean Claudel	Male	Rwanda	Stellenbosch University	Masters
Egwu, Nathaniel	Male	Nigeria	Erasmus Mundus	Masters
Ejigu, Amsalework Ayele	Female	Ethiopia	SACEMA	Masters
Elmardi, Maye Yassin Ahmed	Female	Sudan	University of Cape Town	Masters
Ezeldin, Azza Ali Sharaf Eldin	Female	Sudan	University of Khartoum	Lecturer
Fasan , Mary Oluwasola	Female	Nigeria	Stellenbosch University	Masters
Gamado, Kokouvi Mawuli	Male	Togo	Heriot-Watt University	PhD
Gbenro, Sunday Oluwaseun	Male	Nigeria	Erasmus Mundus	Masters
Hassan, Maïsson Mohamed Zeinelabdien	Female	Sudan	University of Cape Town	Masters
Kentia Tonleu, Klebert	Male	Cameroon	Berlin Mathematical School	PhD
Kazadi Badiambile, Adolphe	Male	DRC	Syracuse University, New York	PhD
Khaleel, Esra Ahmed Mohammed Adam	Female	Sudan	University of Cape Town	Masters
Kumwenda, Khumbo	Male	Malawi	University of the Western Cape	PhD
Mamoade, Lydia Flore	Female	Central African Republic	AUST Abuja, Nigeria	Masters
Mbabazi, Doreen	Male	Uganda	SACEMA	Masters
Mpika Massoukou, Rodrigue Yves	Female	Republic of Congo	University of Kwazulu Natal	Masters
Mudzimbabwe, Walter	Male	Zimbabwe	University of the Western Cape	Masters
Namayanja, Proscovia	Female	Uganda	University of Kwazulu Natal	Masters
Nchejane, John Ngaka	Male	Lesotho	Erasmus Mundus	Masters
Ndayishimye, Joram	Male	Rwanda	Stellenbosch University	Masters
Njima, Mercy Njeri	Female	Kenya	UNU IIST , Macao China	Research fellowship
Nganga, Davy Vilfranc Leone	Male	Republic of Congo	University of Kwazulu Natal	Masters
Nsanzineza, Ibrahim	Male	Rwanda	Syracuse University, New York	Masters
Numapau, Gyamfi Emmanuel	Male	Ghana	University of Warwick, UK	Masters
Nzikou Mamboukou, Michel	Male	Republic of Congo	University of Cape Town	Masters
Oghenekohwo, Felix Onovughe	Male	Nigeria	University of Cape Town	Masters
Ramanandraitsiory, Voarisoa Irina	Female	Madagascar	University of Cape Town	Masters
Ramanjanahary, Tahiry Rabehaja	Female	Madagascar	UNU-IIST, Macao China	Research fellowship
Rashed, Ahmed Mohammed Mostafa	Male	Egypt	Ain Shams Uni. of Mississippi	PhD
Ravelomanana, Huygens Christian	Male	Madagascar	University of Cape Town	Masters
Razafindrakoto, Ando Desire	Male	Madagascar	Stellenbosch University	Masters
Safari Serufuri, Jean Michel	Male	DRC	University of Cape Town	Masters
Sanga, Geomira George	Female	Tanzania	SACEMA	Masters
Sawadogo, Ousmane	Male	Burkina Faso	Stellenbosch University	Masters
Suleiman, Mohammed Hussein Suleiman	Male	Sudan	University of the Witwatersrand	PhD
Teshale Bekele, Bewketu	Male	Ethiopia	SACEMA, Stellenbosch University	Masters
Kemajou, Teudjeu Elisabeth	Female	Cameroon	Southern Illinois University	PhD
Unuigbe, David Moweme	Male	Nigeria	University of Cape Town	Masters
Worku, Dawit Solomon	Male	Ethiopia	University of Cape Town	PhD
Zelege, Terefe Kidist	Female	Ethiopia	University of Houston	PhD



Honours in Biomathematics

In February 2009, an Honours programme in Biomathematics was launched by AIMS in partnership with Stellenbosch University. South African students holding a BSc with a major in mathematics and courses in biological or biomedical fields can apply for this programme. The five students who enrolled this year spent their first 5 months at AIMS, and are currently completing the course at Stellenbosch University.

The students are: Linke Keller, Dephney Mathebula, Hloniphile Sithole, Martijn van der Merwe, and Dietrich Winkler.

The biomathematics honours courses held at AIMS are set out in the table below.

Time period	Contact hours	Lecturer(s)	Course Title
26 Jan - 13 Feb	30	Marshall hampton, Minnesota	Bioinformatics Algorithms in Sequences Analysis
23 Feb - 13 Mar	30	Jotun Hein, Oxford	Topics in Computational Biology
16 Mar - 20 Mar	30	Mark Chaplain, FRDE, Dundee	Advanced topics in Biomathematics I (Reaction - diffusion systems and general partial differential equations)
16 Mar - 3 Apr	30	Philip Maini, Oxford	Advanced topics in Biomathematics II
16 Mar - 3 Apr	30	Philip Maini, Oxford	Advanced topics in Biomathematics II
7 Apr - 24 Apr	30	Jannie Hofmeyer, Stellenbosch	Topics in Biological Sciences
4 May - 22 May	30	Juliet Pulliam	Topics in Biological Sciences

Bursaries for study at South African Universities

Bursaries for Masters study

Towards the end of the Diploma Programme each year, AIMS invites the students to apply for half bursary funding for masters study at South African universities. The bursary offered by AIMS matches the amount offered by the university, and is conditional

on AIMS' approval of the research topic. The AIMS half bursaries are sponsored by Arcadia, Nokia, and Vodacom. The table below outlines the bursaries awarded in June this year.

Institution	Student
AIMS	Amsalework Ejigu (Biomathematics) Nicole Kouemo Tchamga (Mathematical Finance) Lydienne Matchie (Mathematical Finance)
Stellenbosch University	Chidinma Agabawo (Mathematics) Elbasher Mohamed Ahmed (Physics) Eric Ould Dadah (Mathematics) Henintsoa Onivola Minoarivelo (Mathematics) Jacob Mohau Mateyisi (Physics) Friday Ifeanyi Michael (Mathematics) Nathan Muyinda (Mathematics) Wilfrid Ndebeka (Physics)
SACEMA	Josephine Ameh (Mathematics) Asha Kalula (Mathematics) Patrick Phepa (Mathematics) Olina Ngwenya (Mathematics)
University of Cape Town	Olubode Caleb Adetunji (Chemical Engineering) Hussam Eldeen Mohammed (Physics)
University of Kwazulu Natal	Zelalem Berihun (Mathematics) Brian Chilambwe (Mathematics) Epiphanie Patricia Dzoussi Boukama (Mathematics) Michael Oyesola Okelola (Mathematics)
University of Witwatersrand	Marie Chantal Cyulinyana (Physics) Esther Orisakwe (Physics)



Scholarships for PhD study

The German Academic Exchange Service (DAAD)/AIMS agreement entered its second year in the period under review. According to the agreement, five in-region scholarships are awarded annually to AIMS for PhD studies in Mathematics. Nineteen applications were received in November 2008 of which eight were short-listed and sent to DAAD for final selection. DAAD generously granted seven new scholarships for 2009 and renewed the scholarships of four of the 2008 DAAD scholars. Two students of the 2008 intake graduated.

The table below lists the students selected by DAAD for scholarships for 2008 and 2009 and their institutions. Comments are provided where appropriate.

	Name	Institution	Comments
2008	Veronica Sitsofe Ahiati	Stellenbosch University	Was awarded a Masters scholarship. Graduated in March 2009
	Jules Clement Mba	University of the Western Cape	Scholarship renewed for second and final year
	Farai Julius Mhlanga	University of Cape Town	Scholarship renewed for second and final year
	Tony Nsio Nzundu	University of KwaZulu-Natal	Scholarship renewed for second year
	Jean Yves Semegni	Stellenbosch University	Obtained PhD in December 2008
	Tunde Tajudeen Yusuf	University of the Western Cape	Scholarship renewed for second year
2009	Veronica Sitsofe Ahiati	Stellenbosch University	
	Adewunmi Gideon Fareo	University of the Witwatersrand	
	Khumbo Kumwenda	University of the Western Cape	
	Narcisse Roland Loufouma Makala	University of KwaZulu-Natal	
	Dimbinaina Ralaivaosaona	Stellenbosch University	
	Mohamed Suleiman Hussein Mohamed	University of the Witwatersrand	
	Dawit Worku	University of Cape Town	

Research at AIMS

Activities in the AIMS Research Centre took off in earnest after AIMS received a three-year grant from the Department of Science and Technology (administered by the NRF) on 30 January 2009. In addition to the NRF grant, funds have been received from Vodacom. A grant from the Ford Foundation was also available to bring researchers from Africa to visit the AIMS Research Centre.

This most welcome funding enabled the active recruitment of research staff and students. A postdoctoral fellow was appointed in 2008, namely Dr Aziz Ouhinou, who started at AIMS on 1 August 2008 in the field of Biomathematics. Dr Raouf Ghomrasni (pictured opposite) was appointed on 1 January 2009 for one year as a Researcher in Financial Mathematics and Drs Gift Muchatibaya and Hermane Mambili-Mamboundou commenced

two-year postdoctoral fellowships in Industrial Mathematics and Biomathematics, respectively, on the same date. Prof Alan Beardon joined the Research Centre on 1 April 2009 as Honorary Research Fellow for two years, to assist the Director with the development of some of the research activities. Three Masters students, Amsalework Ejigu, Lydienne Matchie and Nicole Kouemo Tchamga commenced their studies on 1 July 2009.

Several research fellows have visited AIMS in the review period (see table below).

Name of Research Fellow	Field of Research	Period of visit
Mahaman, Kabir Mahaman University of Abomey-Calavi, Benin	Nonlinear differential equations	8 Oct - 30 Nov 2009
Diallo, Abdoul Universite d'Abomey-Calavi, Benin	Riemannian and Semi-Riemannian Geometry, Osserman manifolds	8 Jan - 4 Mar 2009
Fewo, Serge University of Yaounde I, Cameroon	Nonlinear optics, Solitons, Optical communications	3 Mar - 8 May 2009
Kitio Kwuimy, Cedrick Aurelien University of Yaounde I, Cameroon	Nonlinear Physics, Nonlinearities in engineering, biological systems and social science	5 Mar - 11 May 2009
Mtisi, Expeditho Dar es Salaam Institute of Technology, Tanzania	Mathematical modelling of malaria and tuberculosis co-infection	12 Mar - 24 May 2009
Gumma, Elzain Ahmed Elzain University of Khartoum, Sudan	Applied Mathematics, Optimization	16 Mar - 19 May 2009
Magombedze, Gesham National University of Science and Technology, Bulawayo, Zimbabwe	The effect of an individual's HIV transmissibility on the HIV transmission dynamics in a population	15 Apr - 19 Jun 2009
Hove-Musekwa, Senelani Dorothy National University of Science and Technology, Bulawayo, Zimbabwe	Modelling of Biomedical Systems	1 Jun 2009 - 31 May 2010
Tabi, Conrad University of Yaounde I, Cameroon	Condensed matter, Physics (Biophysics)	16 Jul - 16 Sep 2009



Research at AIMS (continued)

On 26 January, Avner Friedman from the Mathematical Biosciences Institute in the USA gave a public lecture at AIMS and thereafter a workshop was held where presentations by participants were given on mathematical methods for biology, epidemiology and ecology. The workshop was attended by researchers and postgraduate students from AIMS, SACEMA, the Universities of KwaZulu-Natal and Cape Town, the Durban University of Technology and four foreign institutions.

The AIMS Summer School in Mathematical Finance was held for the second time in February 2009. Two international lecturers participated – Jim Gatheral, Merrill Lynch (lecture topic: - The Volatility Surface) and Tomasz Zastawniak, University of York (lecture topic: - Overview of Monte Carlo Methods for American Options). Sixty-four delegates attended the summer school of which 24 were full-time students. During one of the evenings of the Summer School Zastawniak gave a public lecture on “Mathematics of Fair Dealings.”

A specialised workshop on Orthogonal Polynomials was arranged from 22 to 24 June by Prof. Alan Beardon and was attended by twelve researchers and research students from the Universities of Cape Town, Fort Hare, KwaZulu-Natal, Pretoria, Witwatersrand and Venda, as well as a few of the current AIMS students.

A Journal Club was established where resident researchers, visiting researchers and post-doctoral fellows present work to a broader audience. Since February 2009, presentations have taken place every two weeks.

In order to increase collaboration between AIMS and South African universities, the Director of AIMS, Alan Beardon and Barry Green commenced a series of visits to South African universities. The following visits have taken place: University of the Witwatersrand (Alan Beardon), University of Kwazulu-Natal (Fritz Hahne) and University of the Western Cape (Barry Green and Fritz Hahne).

Conferences and Short Courses

Fritz Hahne and Aziz Ouahine attended a Workshop on Non-linear Differential Equations in Durban from 18-19 May.

AIMS has developed a strong collaborative partnership with the South African Centre for Epidemiological Modelling and Analysis (SACEMA), and the AIMS/SACEMA/DIMACS epidemiological modelling course has become an annual event at AIMS. This year the course was called, “The Clinic on Meaningful Modelling of Biological Data.” It was held from 11 to 16 May 2009 and was attended by forty one participants.

A short course entitled: “Introduction to the Applications of Mathematics in Biology and Medicine,” was jointly hosted by SACEMA (<http://www0.sun.ac.za/sacema/>) and AIMS from 6 - 10

July 2009. The course, which was held at AIMS, was attended by 49 South African students.

The High Performance Computing Winter School was held at AIMS from 13 to 24 July. AIMS co-hosted the course with the Centre for High Performance Computing (<http://www.chpc.ac.za/index.php>).

From 20 to 24 July, a course organised by Umvoto Africa and presented by Professor Calais of Purdue University was held at AIMS.



Seminars and Visitors

Seminars held at AIMS

October 2008

- The mathematics of financial markets, Babatunde Ogunnaike, (Delaware).

November

- Life and Mathematics: A Symmetrical View, Kesh Govinder (UKZN).
- Some exact solutions of a nonlinear Boussinesq system of equations, Mahaman Kabir Mahaman.
- Picard's theorem, Aziz Ouahinou (AIMS postdoctoral fellow).

December

- The Large Hadron Collider (LHC): the world's most powerful microscope and telescope, John Ellis (CERN).
- Ethics of medical research in developing countries: the role of international codes of conduct, Jane Hutton (Department of Statistics, University of Warwick).
- Bayesian Method for determining optimal sample size, Mamane Salha.
- Dynamics of Viscoelastic Liquids & Selected Applications, Tirivanhu Chinyoka (University of Cape Town).

January 2009

- Coins, mobile phones and quantum computing, J W Sanders (International Institute for Software Technology, United Nations University, Macao).
- A Few Astro-topics: Stars, Their Evolution and Cosmology, Paul Taylor (AIMS tutor).
- Reduction of complexity in partial functional differential equations, Ezzinbi Khalil, (Université Cadi Ayadd, Morocco).
- Solitons and Strings, Antal Jevicki (Brown University, United States).
- What banged? Neil Turok, (Perimeter Institute for Theoretical Physics, Canada).

Visitors to AIMS

August 2008

Prof George Philander (University of Princeton) and Frank Shillington, (University of Cape Town).

September

Mr Phil Howarth (Director of Operations in Africa, Frost & Sullivan).

October

Prof Colin Wright (CHPC) and Sean McClean (IBM).

November

Prof Leif Abrahamsson (Uppsala Universiteit).

December

Prof Naresh Dhadhich (Director of the Inter-University Centre for Astronomy and Astrophysics, IUCAA, Pune, India); Dr Phil Charles (Director, SAAO, Cape Town); Dr Chris Hartnady (Umvoto Africa).

February

- Finiteness and Enumeration of Polynomial Systems, Marshall Hampton (Minnesota).
- Detection of center manifolds and applications to space mission design, Maciej Capinski, (Krakow).
- Mathematics of Fair Dealings, Professor Tomasz Zastawniak (York University).
- Option trading for beginners, Sam Webster (FX Derivatives Trader, BNP Paribas).
- Genetic recombination in HIV, Darren Martin (Department of Infectious Diseases and Molecular Medicine, NBN node, University of Cape Town).

March

- The Klauder-Daubechies Phase Space Path Integral and the Harmonic Oscillator, Jan Govaerts (Catholic Univ. of Louvain).
- Mathematical modelling of solid tumour growth: Can calculus cure cancer? Prof. Mark Chaplain (FRSE).
- Shaken not stirred, bounds on stratified mixing, Prof. Colm Caulfield (Cambridge, BP Inst.).
- A brief journey through the world of elliptic curves, Marc Hindry (Diderot Paris VII).
- On algebraic geometric codes: Finite fields revisited, Barry Green (Stellenbosch University).

June

- In-vivo mathematical study of co-infection dynamics of HIV-1 and Mycobacterium tuberculosis, Gesham Magombedze (National University of Science and Technology, Bulawayo, Zimbabwe).

January 2009

Prof Boas Erez (Erasmus Mundus); Dr Charles Harper (Senior Executive VP of the John Templeton Foundation, USA); Dr Gilbert Siko (Department of Science and Technology).

February

Prof Pearson (Cambridge University).

March

Michel Wachs, Paris, France; Dr Shirley Ann Jackson (President of the Rensselaer Polytechnic Institute, USA, and other members of her staff).

May

Wilson Aiwuyor (Syracuse University in New York State).

June

Dr Sreeram Valluri (University of Western Ontario); Ebrahim Hassim (Vodacom Foundation).

AMI-Net / Next Einstein Initiative

The African Mathematical Institutes Network (AMI-Net) was founded at AIMS in 2004. Its purpose is to develop partnerships between mathematical science centres across Africa. In January 2009, a meeting of AMI-Net was convened at AIMS to consider the AIMS Next Einstein Initiative. The meeting was attended by the following country representatives as well as members of AIMS staff, and council:

- Dr Manar Elsheikh Abdel-Rahman, University of Khartoum, Faculty of Mathematical Sciences, Department of Statistics, Sudan.
- Prof Francis Allotey, Institute of Mathematical Sciences (IMS), Legon-Accra, Ghana.
- Dr Berhanu Belayneh, Addis Ababa University, Faculty of Sciences, Department of Mathematics, Ethiopia.
- Prof Khalil Ezzinbi, Université Cadi Ayyad, Faculty of Sciences - Semlalia, Department of Mathematics, Marrakech, Morocco.
- Prof Sarifa Fagilde, Advisor of the Minister, Ministry of Science and Technology, Maputo, Mozambique.
- Dr John Mango, University of Makerere, Department of Mathematics, Kampala, Uganda
- Prof Jamal Mimouni, Université Mentouri, Faculty of Sciences, Department of Physics, Constantine, Algeria.
- Dr Hilaire Nkounkou, Université Marien NGOUABI, Faculty of Sciences, Department of Mathematics, Brazzaville, République du Congo.
- Dr Gerard Razafimanantsoa, University of Antananarivo, Faculty of Sciences, Department of Mathematics, Madagascar.
- Prof Mamadou Sanghare, Université Cheikh Anta DIOP de Dakar, Faculté des Sciences et Techniques, Département de Mathématiques et Informatique, Sénégal.
- Dr Joel Tossa, Université d'Abomey-Calavi, Institut de Mathématiques et de Sciences Physiques (IMSP), Porto-Novo, Bénin.
- Dr Philippe Mawoko, NEPAD Office of Science and Technology.

Country representatives presented updates of their plans to host AIMS centres, and the AIMS Next Einstein Initiative overview was discussed, edited and agreed upon. The finalised plan is now being distributed widely to raise funds for the development of new AIMS centres across Africa.

Dr. John Mugabe was appointed as a consultant to AIMS-NEI in March 2009. Dr Mugabe, who was formerly the director of the NEPAD Office of Science and Technology, will be assisting with gathering support for AIMS-NEI and AMI-Net.

In April 2009, Fritz Hahne, John Mugabe, Neil Turok and former AIMS student and tutor Yves Semegni, visited Senegal to discuss the proposed establishment of an AIMS centre in Senegal. Vincent Rivasseau and Marie-Pierre Barre had already prepared plans for this centre, with Mamadou Sanghare and his team.

Three of the PGD lecturers made visits to other African countries after lecturing at AIMS: Delfim Torres visited Maputo (Mozambique) from 3rd to 9th April 2009; Vincent Rivasseau visited Cotonou (Benin) from the 9th to 22nd Feb 2009 and Jan Govaerts visited Cotonou, (Benin) from 16-20 March 2009.



**NEXT
EINSTEIN**

AIMS Schools Enrichment Centre (AIMSSEC)

Background

The African Institute for Mathematical Sciences Schools Enrichment Centre (AIMSSEC) is based at AIMS in Muizenberg. It was established in 2003 under the leadership of Toni Beardon with the objectives of extending educational opportunities to more young people in South Africa and introducing new skills to the teaching of mathematics. The courses are taught by visiting lecturers, most of whom are overseas volunteers. Barrie Barnard was appointed as full time Manager from March 2009.

All of the activities of AIMSSEC depend entirely on sponsorship funding. Bursaries for teachers who come from disadvantaged communities, are provided by the British and Foreign Schools' Society, the Western Cape and KwaZulu Natal Education Departments, or donations from Oxford and Cambridge colleges. AIMSSEC draws on the resources and expertise of the Cambridge University Millennium Mathematics Project (MMP - <http://mmp.maths.org>) which are distributed to South African Schools as a collection of learning materials on CD.

Training courses

The website www.aimssec.aims.ac.za offers details of AIMSSEC courses and events, as well as a problems' page.

Assisted by a large international group of more than thirty experienced academics and teacher trainers, AIMSSEC runs two types of professional development courses for mathematics teachers based on a blended-learning approach. The preliminary three-month course includes a ten day residential component held in the school holidays with sixty-five hours of face-to-face tuition. In July 2009, AIMSSEC conducted its eleventh and twelfth course. Over the last six years this course has been attended by a total of 560 mathematics teachers and subject advisers from disadvantaged communities, from all over South Africa. Teachers take away from the course a large collection of resources for teaching mathematics.

The preliminary course is a pre-requisite for the two-year professional development programme to train mathematics subject leaders (launched in January 2009) and accredited by Stellenbosch University as an NQF level 6 qualification. This is an innovative technology enhanced programme taught by AIMSSEC in collaboration with the Institute for Mathematics and Science Teaching of the University of Stellenbosch (IMSTUS). The programme utilises the University's platform consisting of satellite and mobile technology to create virtual learning spaces for synchronous knowledge construction. In addition to the residential and e-learning components of this course, participants attend Saturday sessions at one of the Stellenbosch University's

Interactive Telematic classrooms, a network which extends across South Africa. The course is designed with the needs of teachers from the more remote rural areas in mind and there is a growing Teacher Network of school clusters across the country.

Other activities

Enrichment for teachers and learners of all ages is provided by linking South Africa and UK schools through AIMSSEC Motivate video-conference master-classes held at the MTN Science Centre in Canal Walk. During October 2008, grade 11 learners from the Cape Academy of Mathematics and Science and The College of Science and Technology (COSAT) linked to schools in the UK and enjoyed a full day programme on proof in mathematics.

Under the guidance of AIMSSEC, groups of AIMS students have taught Saturday morning mathematics classes held at AIMS for learners from Crestway High School, Grassy Park High School, Hout Bay High School, Fairmont Secondary School, Masiphumelele High School and Muizenberg High School.

Future plans

AIMSSEC is exploring the formation of a partnership with the Western Cape Education Department to train and tutor teachers and grade 12 learners. AIMSSEC plans to build capacity in the AIMSSEC Teacher Network through the establishment of two new Interactive Telematic Education (ITE) classrooms which will host workshops and training sessions broadcast from Stellenbosch. Plans to strengthen the teacher network include: AIMSSEC staff visiting groups of teachers in the new centres, circulating an AIMSSEC newsletter every 6 months, and re-establishing the AskAIMS online forum through the AIMSSEC website.

AIMSSEC also plans to expand the distribution of free interactive resources to promote activity-based learning and to support the National Curriculum Statement learning outcomes. A hands-on road-show is also envisaged with activities for learners to support teachers and to promote mathematics.

AIMSSEC is presently seeking funds to expand its staff component to meet the growing demand for its programmes.

AIMSSEC Sponsors

British and Foreign Schools Society
Department of Education: Kwazulu Natal
Department of Education: Western Cape
Education Without Borders
Dr David Race

Soroptimist Club of West Lothian
St John's College, Cambridge
Victor Rothschild Memorial Fund
Weoley Hill United Reform Church
Zenex Foundation



Governance and Infrastructure

The AIMS Council

AIMS is governed by a Council on which each of the six partner universities is represented. Council members include representatives from the six participating universities.

The members are currently:

Jan van Bever Donker (University of the Western Cape), Fritz Hahne (AIMS), Hendrik Geyer (Stellenbosch University), Daya Reddy (University of Cape Town), Keith Moffatt (University of Cambridge), Graham Richards (Oxford University), Vincent Rivasseau (Université de Paris Sud XI) with Neil Turok (Cambridge University and Perimeter Institute for Theoretical Physics) as Chair. The AIMS Council met on 8 January 2009. In July 2009 a new member was appointed to the AIMS Council (Tsou Sheung Tsun from Oxford University).

AIMS Advisory Board

The AIMS Advisory Board consists of representatives of the southern African mathematical sciences community. It advises on all academic aspects of the AIMS programme, in particular its integration with existing courses and research projects in South African and other African universities. Its current members are Edward Lungu (University of Botswana) Chair, Jacek Banasiak (University of KwaZulu-Natal), Kathy Driver (University of Cape Town), Barry Green (Stellenbosch University), Sizwe Mabizela (Rhodes University), Thandi Mgwebi (NRF), Harm Moraal (North-West University), David Sherwell (University of the Witwatersrand), Sibusiso Sibisi (Council for Scientific and Industrial Research), Hlengani Siweya (South African Mathematical Society), Arnold van Zyl (Stellenbosch University) and Patricia Whitelock (South African Astronomical Observatory). The AIMS Advisory Board met on 24 June 2009.

AIMS Executive Team

Membership of the AIMS Executive Team (AET) remained unchanged. Francis Benyah (University of the Western Cape), Kristian Müller-Nedebock (Stellenbosch University) and Vasco Brattka (University of Cape Town) assisted the Chair of the AET, Fritz Hahne, with the selection of students for the Postgraduate Diploma Programme and DAAD applications. The AET's role is also to facilitate the relationship between AIMS and the three participating South African universities.

Staff

Four new appointments were made in the period under review. Deborah Wilsnagh was appointed in August 2008 as Financial Administrator, Barrie Barnard started as AIMSSEC Manager in March 2009, Alfred Tswinyane Mahlangu joined the AIMS staff as IT Administrator in April 2009 and Liesl Jones commenced duties as Administrative Officer in July 2009. Fritz Hahne continued as Director of the Institute with Igsaan Kamalie and Emmanuel Kongolo in Logistics and Facilities, A'eeda Mpofu, Lynne Teixeira and Gudrun Schirge in Administration, Frances Aron as the English and Communications teacher, and Jan Groenewald in Information Technology. Andy Rabagliati left AIMS at the end of November 2008.

Tutors

A number of tutors were appointed as teaching assistants for the whole or part of the diploma course during the 2008/9 academic year as well as for the new 2009 Honours course in Biomathematics. They were: Veronica Ahiati (Ghana), Miangaly Gaelle Andriamaro (Madagascar), Mathieu Ehrhardt (France), Hermane Mambili (Gabon), Gift Muchatibaya (Zimbabwe), Aziz Ouhinou (Morocco), Andriamihaja Ramanantoanina (Madagascar), David Richards (United Kingdom), Yves Semegni (Cameroon) and Paul Taylor (USA).





AIMS

www.aims.ac.za

New AIMS Logo

In 2008, AIMS adopted a new logo based on that of the AIMS Next Einstein Initiative. The new logo brings a clear, positive spirit to the vision of AIMS, and the inclusion of AIMS' original colours in the sun's rays, provides continuity with AIMS' earlier public profile.

Information technology

In 2008/9 the IT infrastructure started receiving a much needed update. The Research Centre was linked up with a fibre connection, and a Linux-based IP PBX was set up to expand the phone system. The wireless access was expanded to include the ground and first floors and the Research Centre buildings. An off-site virtual server was upgraded to host the new website currently being developed.

Eighty-seven desktops were decommissioned at the end of 2008/9. The new equipment installed includes 125 powerful desktops from Dell, with a 5-year warranty. Two new file servers, to be used for storage, were ordered on the SUN Matching Grant Program for Research institutes. A small backup server room is being developed for redundancy. Data projection facilities were installed in the Research Centre. The PGD computer lab data projection facilities are being expanded, and a equipment reserve fund has been started to facilitate planning future upgrades.

Due to budgetary constraints and the price increase accompanying the TENET switch from Telkom to Neotel/Internet Solutions (for small sites such as AIMS), the envisioned international bandwidth increase has not been realised. However, the new 2Mbps South African circuit has improved AIMS's access to other universities and software mirrors.

A South African AIMS alumnus, Alfred Tswinyane Mahlangu, has joined the IT department as a systems administrator. Alfred has worked in similar environments, supporting scientists at NASSP and at University of KwaZulu-Natal.

The work of the IT department goes beyond infrastructure, and includes collaborating with the academic and research programmes and working with scientific software (python-based front-end to most mathematical packages, SAGE www.sagemath.org, and the LaTeX mathematical typesetting software).

During the PGD, the courses "Computing and LaTeX", and "Ubuntu Linux installation for Scientists" www.ubuntulinux.org were offered by the ICT Manager, Jan Groenewald.

Facilities

AIMS acquired another building in November 2008 in order to provide accommodation for its growing number of visitors. The new building is located in Watson street adjacent to the double-storey house which accommodates tutors and researchers.

The exterior of the main AIMS building has been repainted and the bedrooms and bathrooms for lecturers and guests have been refurbished.





STELLENBOSCH UNIVERSITY
AIMS R028

Financial Statement for the year ended 31 December 2008

	TOTAL 31/12/2008	DIPLOMA & ACADEMIC PROGRAMME	BUILDING	POST AIMS BURSARIES	HONOURS PROGRAMME	RESEARCH PROGRAMME	ENDOWED SCHOLARSHIPS	NEXT EINSTEIN INITIATIVE & AMINET	PRIOR YEAR 31/12/2007
	R 19,137,609.02	R 6,498,490.10	R 5,317,452.57	R 1,114,603.75	R 120,000.00	R -	R 3,411,443.35	R 2,675,619.25	R 9,842,837.87
TOTAL INCOME	R 19,137,609.02	R 6,498,490.10	R 5,317,452.57	R 1,114,603.75	R 120,000.00	R -	R 3,411,443.35	R 2,675,619.25	R 9,842,837.87
Andrews	R 15,155.80	R 15,155.80							-
Anglo American Chairman's Fund	R 1,500,000.00		R 1,500,000.00						-
Anonymous	R 39,538.17	R 39,538.17							-
Arcadia Trust	R 2,238,960.00		R 2,238,960.00						-
Avery Tsui Foundation	R 963,954.59	R 613,954.59		R 350,000.00					R 895,348.84
Avery Tsui Foundation	R 2,276,709.14						R 2,276,709.14		-
Avery Tsui Foundation (Sculpture)	R 118,614.51	R 118,614.51							-
Barclays PLC	R 1,992,472.80	R 1,992,472.80							-
Byers Family	R 2,675,619.25							R 2,675,619.25	-
Cambridge University Press	R 382,027.00	R 382,027.00							R 353,851.00
Charities Aid Foundation (Arcadia Trust)	R -								R 1,671,936.00
DAAD	R 434,485.00			R 434,485.00					-
Department of Education	R -								R 3,000,000.00
Department of Science and Technology	R 877,192.98	R 877,192.98							R 1,000,000.00
Development Bank of SA	R -								R 225,234.00
Ford Foundation	R -								R 1,161,197.50
Foreign Exchange Profit	R 2,241.32	R 2,241.32							-
IC Volunteers	R -								R 278,128.62
ICIAM	R 23,137.50	R 23,137.50							-
Ilse of Man Government (Overseas Aid Committee)	R 219,600.00			R 219,600.00					-
Interest Received	R 939,822.59	R 824,993.47					R 114,829.12		R 687,407.80
London Mathematical Society	R -								R 208,596.00
Lorenz	R 158,152.67	R 158,152.67							-
Miscellaneous Income	R 331,881.28	R 264,503.71	R 67,377.57						R 159,374.11
Neil Turok (Sapling Foundation)	R 1,019,905.09						R 1,019,905.09		-
New Star Asset Management	R 75,686.50	R 75,686.50							-
NITHeP	R 170,260.80	R 170,260.80							-
Nokia	R 331,556.25	R 221,037.50		R 110,518.75					-
P Kellner	R 303,561.22	R 303,561.22							-
Paris-Sub University	R 12,838.53	R 12,838.53							-
SACEMA	R 140,000.00	R 20,000.00			R 120,000.00				R 121,550.00
Standard Bank of SA	R -								R 30,000.00
The Harold Hyam Wingate Foundation	R 164,700.00	R 164,700.00							-
University of Kwazulu-Natal	R -								R 50,214.00
J Westergren	R 1,511,115.00		R 1,511,115.00						-
Workshop – Finance	R 218,421.03	R 218,421.03							-
LESS TOTAL EXPENDITURE	R 14,754,258.14	R 9,443,967.28	R 3,083,670.82	R 1,362,485.00	R -	R 183,942.71	R 51,581.00	R 628,611.33	R 8,023,928.50
Administration Fees	R 36,360.00	R 36,360.00							R 34,440.00
Advertising	R 30,248.88	R 30,248.88							R 16,659.07
Affiliation, Registration and Student cards	R 84,228.19	R 83,307.19					R 921.00		R 5,525.00
Audiovisual Expenditure	R 36,702.77	R 36,702.77							R 9,290.19
Book and periodicals	R 672.00	R 672.00							R 200.00
Building, Building Refurbish, Costs, Equipment & Furniture	R 3,581,286.00	R 497,615.18	R 3,083,670.82						R 474,802.50
Bursaries	R 1,422,485.00			R 1,362,485.00		R 60,000.00			R 853,580.00
Catering	R 1,848,868.43	R 1,825,464.43					R 22,000.00	R 1,404.00	R 1,361,397.72
Cleaning and Sanitation	R 37,476.33	R 37,476.33							R 10,080.40
Computer Materials	R 161,071.45	R 127,910.90				R 33,160.55			R 35,386.67
Consultation Fees and Services	R 314,970.27	R 312,220.27						R 2,750.00	R 92,700.00
Consumables	R 164,307.04	R 164,307.04							R 117,734.19
Copying and Printing	R 44,447.69	R 44,447.69							R 75,492.15
Courses	R 31,880.00	R 31,880.00							R 95,767.33
Flowers and Gifts	R -								R 1,963.75
Foreign Exchange Loss	R 2,874.18	R 2,874.18							R 1,724.00
Photographic Materials	R 3,586.44	R 3,586.44							R 1,969.90
General Office Expenses	R 29,653.00	R 27,272.00					R 2,381.00		R 41,917.75
Insurance	R 57,063.30	R 57,063.30							R 41,358.87
Internet Expenses	R 200,835.00	R 200,835.00							R 190,495.82
Maintenance of Equipment	R 27,035.40	R 27,035.40							R 53,063.57
Medical Expenses	R 138,540.92	R 130,943.92				R 6,405.00	R 1,192.00		R 198,339.97
Municipal Expenses: Electricity, Rates, Refuse, Water	R 313,618.23	R 309,416.23					R 4,202.00		R 2,565.21
Postage	R 2,042.90	R 2,042.90							R 1,797,243.96
Remuneration	R 2,667,832.89	R 2,621,650.89				R 46,182.00			R 250.00
Rent of Equipment	R 25,252.20	R 25,252.20							R 1,495.20
Rent of Rooms	R -								-
Repatriation costs (Students)	R 353,800.00	R 348,184.00					R 5,616.00		-
Security Services	R 9,413.68	R 9,413.68							R 7,431.96
Stationery	R 62,550.12	R 60,127.81						R 2,422.31	R 29,734.67
Student Stipends	R 480,571.00	R 473,877.00					R 6,694.00		R 451,325.00
Telephone and Cell Phone Costs	R 60,986.01	R 60,504.45						R 481.56	R 53,952.55
Travel Expenses	R 2,523,598.82	R 1,855,275.20				R 38,195.16	R 8,575.00	R 621,553.46	R 1,720,279.74
NET SURPLUS	R 4,383,350.88	R -2,945,477.18	R 2,233,781.75	R -247,881.25	R 120,000.00	R -183,942.71	R 3,359,862.35	R 2,047,007.92	R 1,818,909.37
ACCUMULATED FUNDS AT 1 JANUARY 2008	R 10,574,851.37	R 7,618,707.37	R -	R 662,350.00	R -	R 986,390.00	R -	R 1,307,404.00	R 8,784,075.93
ACCUMULATED FUNDS – YEAR TO DATE	R 14,958,202.25	R 4,673,230.19	R 2,233,781.75	R 414,468.75	R 120,000.00	R 802,447.29	R 3,359,862.35	R 3,354,411.92	R 10,602,985.30
LESS:	R 6,451,801.02	R 931.50	R -	R -	R -	R -	R 2,720,892.02	R -	R 28,133.93
Acquisitions – 5 & 7 Melrose Road	R 3,729,977.50		R 3,729,977.50						-
Acquisitions – 14 Watson Street	R 2,720,892.02						R 2,720,892.02		-
Assets: Motor Vehicles	R 192,136.96	R 192,136.96							R 192,136.96
Accumulated Depreciation	R -182,102.03	R -182,102.03							R -145,700.87
Debtors	R 71,400.00	R 71,400.00							-
Sundry Creditors	R -19,204.83	R -19,204.83							R -7,536.08
Leave provision	R -60,617.10	R -60,617.10							R -10,084.58
Petty cash control	R -681.50	R -681.50							R -681.50
FUNDS AVAILABLE AT 31 DECEMBER 2008	R 8,506,401.23	R 4,672,298.69	R -1,496,195.75	R 414,468.75	R 120,000.00	R 802,447.29	R 638,970.33	R 3,354,411.92	R 10,574,851.37

SIGNED

Ms F Majiet
Head: Financial Services

Notes to the financial statement AIMS R028

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

Income

1. The first donation shown from Avery Tsui Foundation is for 9 diploma student bursaries and 9 half-bursaries for Post AIMS Studies.
2. Funding received from Barclays PLC is for 20 diploma student bursaries.
3. The donation from Cambridge University Press is for 6 diploma student bursaries.
4. The funds received from the Department of Science and Technology cover:
 - 4.1. A grant for African tutors and researchers
 - 4.2. A contribution to core funding.
5. The donation received from Isle of Man is for 4 Post AIMS Bursaries.
6. Funding from New Star Asset Management is for 1 student bursary.
7. Funding received from Nokia is the first of two payments towards 5 diploma student bursaries and 5 half-bursaries for Post AIMS studies.
8. The donation received from The Harold Hyam Wingate Foundation is for 2 diploma student bursaries.
9. The donation received from the Byers Family is in support of the Next Einstein Initiative for expenses paid both locally and abroad. The income reflected in the financial statement refers to the funding retained locally and the balance is reflected in the AIMS Support Trust in the United Kingdom.
10. Funding received from Anglo American Chairman's Fund, Arcadia Trust and Jussi Westergren are contributions towards the acquisition, restoration and alterations of the Research Centre.
11. Donations received from Avery Tsui Foundation, Peter Kellner and Neil Turok (Sapling Foundation) were used to create endowed scholarships in the name of Stephen Hawking and Martin Rees. A further endowed scholarship was received from The Paul G. Allen Family Foundation, however, transfer from the Friends of University of Stellenbosch took place late January 2009.

Expenses

- 12.1 Bursaries and stipendia, staff remuneration, meals for students, conferences and visitors, and travel costs (students and lecturers) comprise the largest portion of the expenses.
- 12.2 Administration Fees refer to costs for delivering administrative support to AIMS by Stellenbosch University.
- 12.3 Building, Building Refurbishment Costs, Equipment and Furniture include costs for repair and maintenance of existing buildings and final costs relating to the expansion and upgrade of new property.

Balance

As per the Financial Statement for the year ended 31 December 2008, accumulated funds include earmarked funds as listed. For the 2008 financial year, the shortfall for the upgrading of the new Research Building was taken from existing funds available which form part of the AIMS Diploma and Academic Programme.

Events after year-end

1. Grant of R3.6 million for the 2008/2009 year received on 23 December 2008 from the National Research Fund (NRF) for new cost centre NRF: AIMS Research Centre. The grant is for a three year period.
2. VAT Output was deducted from the grant received from the Department of Science and Technology and paid over to the South African Revenue Services in error. The correction was processed during the 2009 financial year and the refund will be reflected in the financial statement for 2009.



STELLENBOSCH UNIVERSITY
 AIMSSEC – R268

Financial Statement for the year ended 31/12/2008 31/12/2007

	R	R
INCOME	431,647.41	584,398.68
Donations	-	-
All Souls College, Oxford	-	13,743.10
Balliol College, Oxford	-	1,231.26
British and Foreign Schools Society	64,124.93	-
Christ Church, Oxford	-	2,685.48
Churchill College, Cambridge	-	1,966.17
Clare College, Cambridge	-	612.55
Clare Hall, Cambridge	-	2,652.20
Exeter College, Oxford	-	6,916.75
Girton College, Cambridge	-	2,652.86
Jesus College, Cambridge	-	3,922.62
Kings College, Cambridge	-	2,580.06
Mrs P.R. Ledger	-	1,226.33
Magdalene College, Cambridge	-	568.32
Nuffield College, Oxford	-	4,012.50
Oriel College, Oxford	-	705.72
Dr David Race	1,538.85	-
Sidney Sussex College, Cambridge	-	553.41
Soroptimist Club of West Lothian	14,659.20	-
St Hughes College, Oxford	-	1,265.05
St John's College, Cambridge	15,165.00	13,820.60
St John's College, Oxford	-	2,666.44
Mrs D.E. Townsend	-	3,252.85
Trinity College, Cambridge	-	314,325.07
Trinity Hall, Cambridge	-	20,681.66
MMP, University of Cambridge	-	5,593.80
University of Cambridge Local Examinations Syndicate	-	13,752.40
Victor Rothschild Memorial Fund	-	138,600.00
Weoley Hill United Reform Church	10,019.70	-
Wolfsen College, Oxford	-	3,377.21
Other income: Surcharge	59,662.01	-
Department of Education: Kwazulu Natal	100,800.00	-
Department of Education: Western Cape	145,600.00	-
Foreign Exchange Profit	780.83	589.64
Interest Received	19,296.89	20,444.63
EXPENDITURE	590,864.96	347,513.92
Advertising	21,117.98	-
Accommodation and Catering	136,387.80	151,645.47
Books	2,426.01	-
Consultation Fees and Services	5,000.00	4,900.00
Foreign Exchange Loss	76.20	353.84
General Office Expenses	12,898.70	200.00
Postage	995.16	667.08
Services	8,705.00	12,686.86
Stationery	23,133.09	3,124.55
Sundry Expenses	-	-
Travel Expenses	380,125.02	173,936.12
NET SURPLUS FOR THE YEAR	-159,217.55	236,884.76
ACCUMULATED FUNDS AT 1 JANUARY 2008	382,748.69	145,863.93
FUNDS AVAILABLE AT 31 DECEMBER 2008	223,531.14	382,748.69

SIGNED.....

Ms F Majiet
 Head: Financial Services

Supporters of AIMS

AIMS acknowledges with gratitude the generous support of the following donors:

Current Donors

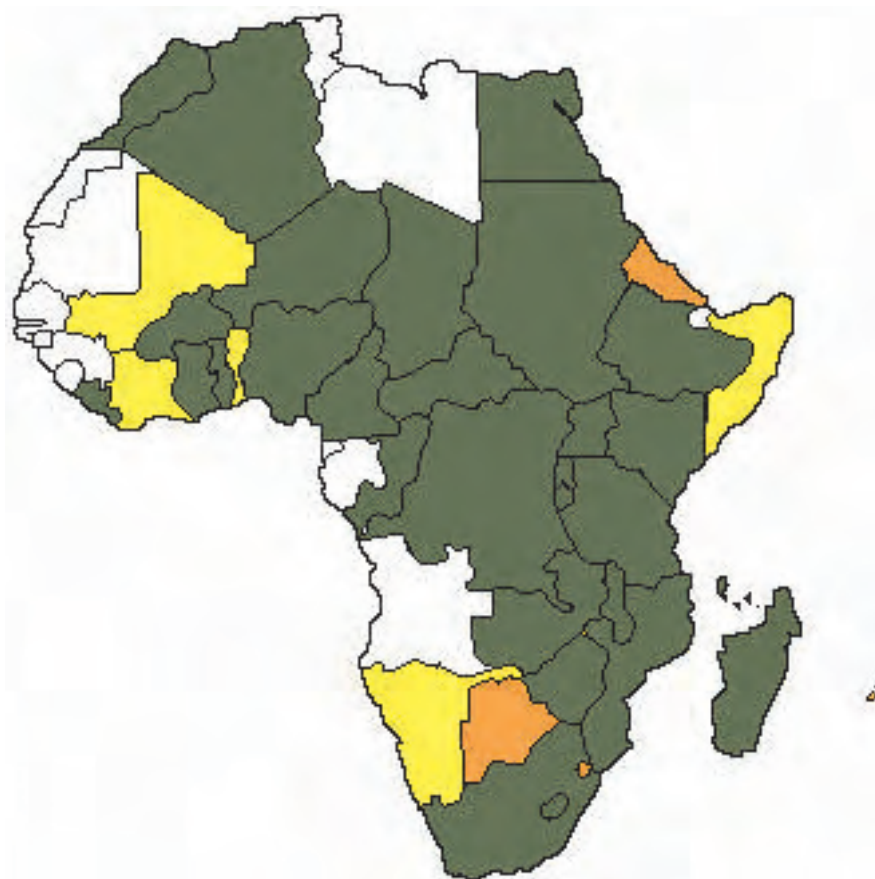
The Department of Higher Education and Training, South Africa	Vodacom Foundation
Department of Science and Technology, South Africa	Cambridge University Press
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Barclays	Isle of Man Government Overseas Aid Committee
Byers Family	DAAD
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Paul G. Allen Family Foundation	New Star Asset Management
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The Avery-Tsui Foundation	The Muizenberg Millenium Education Trust
National Research Foundation	The Victor Rothschild Memorial Fund
Neil Turok	ICIAM
Peter Kellner	Prof Brian Abrahamson (Flinders University, Australia) – donation of books
Sheridan Lorenz	Prof John Webb (University of Cape Town) – donation of books

Previous Donors

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Fred Turok
Stella Innes (donation of Evan Innes mathematical research library)
British Airways, South Africa Office
Chicago State University
European Mathematical Society Committee for Developing Countries
Jonathan Leake, Sunday Times

AIMS Progress Map

AIMS' progress to date: AIMS has graduated students from countries marked green, students have been admitted from countries marked orange, and AIMS has received applications from countries marked yellow.





African Institute for Mathematical Sciences

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AIMS

$$\lim_{t \rightarrow \infty} \frac{1}{(2\pi)^{\frac{1}{2}}} \int_{-\frac{h}{\sigma\sqrt{t}}}^{\frac{h}{\sigma\sqrt{t}}} \exp\left\{-\frac{z^2}{2}\right\} dz = 0$$

$$V(n) = \begin{cases} n\sigma^2, & \mu = 1 \\ \frac{(1-\mu^n)\sigma^2\mu^{n-1}}{1-\mu}, & \mu \neq 1 \end{cases}$$

$$L(x, z, \lambda, \nu; \mu) = f(x) + \lambda^T c_e(x) + \nu^T (c_I(x) - z^s) + \frac{1}{2\mu} \|c_e(x)\|^2 + \frac{1}{2\mu} \|c_I(x) - z^s\|^2$$

$$E = \frac{1}{\sqrt{2\pi}} m (c^2 - 1) \lim_{n \rightarrow \infty} \left(\frac{c^2 n!}{n^n \sqrt{n}} \right)$$