

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Ronald E. Young, BSc, MSc UWI, PhD St. And.
– Head of Department



The Department in the course of the past year has come a long way in terms of rehabilitating its image. Although functioning essentially as separate entities, the Sections have co-operated and have both enhanced their teaching assessments and their image in the eyes of the students. Both Sections have worked at developing justifications as to why they should be separated and would function better as separate Departments, and have presented strategic developmental plans to support these proposals. Much effort was placed in

the Mathematics Section on improving teaching quality and student centeredness. Average scores on student assessment of teaching over the year were 4.06 (SE 0.09) for lecturers and 3.91 (SE 0.07) for courses. In the Computer Science Section, Student Assessments were available only for Semester I and averaged 3.89 (SE 0.47) for lecturers and 3.61 (SE 0.41) for courses.

Staffing

In the Computer Science Section **Dr. Suresh Sankaranarayanan** and **Dr. James (Huw) Evans** were appointed toward the end of academic year at the Lecturer level. **Miss Phillipa Bennett** and **Mr. Carl Beckford** were appointed as Temporary Assistant Lecturers to assist with the teaching duties for Lila Rao and Gunjan Mansingh, who were given lighter teaching loads for the final year of their PhD (Information Systems) programme. In June, 2008, **Dr. Lila Rao-Graham** successfully defended her thesis dissertation, entitled “*An exploration of quality issues in the context of the design of data warehousing, knowledge management and e-commerce systems*”.

Staffing in the Mathematics Section remained quite stable this year. Ms. N. Guthrie-James did not renew her one-year contract and Ms. Kadeshia Thomas was taken on as a part-time Assistant Lecturer.

Student Registrations and Throughput

	Maths (BSc)	Actuarial Science	Math with Education	Computer Science Major
Prelim.	266			
Level 1	319	30	1	27
Level 2	149	46	1	114
Level 3	93	36	4	111
*TOTAL:	444	92	6	259

*Totals do not equal the sum of the levels since students may register at two levels simultaneously. The numbers given represent FTEs with Part-time students counted as ½ Full-time.

A total of 52 students from the Faculty of Pure and Applied Sciences and 20 students from the Faculty of Humanities and Education completed the **Computer Science major**. These numbers are further broken down by gender and class of degree as follows:

Faculty	PAS			H&E		
	M	F	Total	M	F	Total
First	3	0	3	0	0	0
Upper 2nd	6	5	11	0	2	2
Lower 2nd	13	7	20	4	4	8
Pass	15	3	18	4	6	10

MATHEMATICS SECTION

Dr. Raymond McEachin – Section Head

PAPERS PRESENTED

C. Kelly

- Discretising a Polynomial Differential Equation with Fading Stochastic Perturbation, Seventh AIMS International Conference on Dynamic Systems and Differential Equations, May 2008, University of Texas, Arlington, TX, USA.
- Explosions and Hard Landings in Discretized Nonlinear Stochastic Equations, IX International Conference: Approximation and Optimization in the Caribbean, March 2008, San Andres Island, Colombia.
- Stabilisation and Destabilisation by Noise, UWI, Mathematics Seminar, September, 2007, University of the West Indies, Mona,

A. Rodkina

- “The Practice and Theory of Stochastic Simulation”, The International Workshop, Palo Alto, U.S.A., October, 2007.
- “Optimization and Approximation in Caribbean”, The International Conference, San Andres, Colombia, February 2008.

I. Solan

- “Objective Approach for Evaluating Individual Performance in a Group”. 8th Conference, February, 26-28, 2008, Faculty of Pure and Applied Sciences, University of the West Indies, Mona.

F. Arunaye

- On the constants of the motion of the generalized ermakov systems. 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, University of Texas at Arlington, USA, May 18-21, 2008. Pp. 234.

- Computing exact symmetries of dynamical systems from their reduced system of equations can be interesting. 7th WSWAS International Conference on Applied Computer and Applied Computational Sciences (ACACOS'08), Hangzhou, China, April 6-8, 2008.
- Exact symmetries of the Kepler Problem from its reduced system of equations. 8th Conference, Faculty of Pure and Applied Sciences, University of the West Indies, Mona, February 26-29, 2008.
- On the Ernammo-Bernoulli and Quasi-Ermanno-Bernoulli constants for linearizing dynamical systems. 9th WSEAS International Conference on Mathematical and Computational Methods in Science and Engineering (MACMESE' 07) UWI, St. Augustine, Trinidad, November, 5-7, 2007.

Ponakala Nagarani

- **Nagarani, P.** Sarojamma, G. and Jaywraman, G.: "On the dispersion of a solute in a Casson fluid flow in an annulus with boundary absorption", pp. 265-273, WSEAS Conference on Recent Advances on Applied Mathematics, Harvard University, Massachusetts, USA, March 24-26, 2008.
- **Nagarani, P.** Sarojamma, G.: "Flow of a Casson fluid through a stenosed artery subject to periodic body acceleration" pp. 236-243, 9th WSEAS International Conference on Mathematics and Computational methods in Science and Engineering, UWI, Trinidad, Nov 5-7, 2007.

Wen-Bin Zhang

- "Beurling Generalized Primes". Department of Mathematics, Hong Kong University, Hong Kong, June 10-14, 2008.

PUBLICATIONS

Refereed Journal Articles

- * John A.D. Appleby, **Conall Kelly**. "Spurious oscillation in a uniform Euler discretisation of linear Stochastic Differential Equations with vanishing delay". *Journal of Computational and Applied Mathematics*, 205(2): 923-935, 2007.

- * Appleby, J.A.D., Berkolaiko G. and **Rodkina, A.** On the Asymptotic Behavior of the Moments of Solutions of Stochastic Difference Equations. Proceedings of the International Conference “Difference Equations, Special Functions and Orthogonal Polynomials”, Munich, Germany, 2005. *World Scientific Publishing*, (2007), 557-565.
- * Appleby J. A. D. Mackey D. and **Rodkina, A.** Almost sure polynomial asymptotic stability of stochastic difference equations. *Journal of Mathematical Science.* **149**(6), (2008), 1629-1647.
- * **Alexandra Rodkina**, Henri Schurz, Leonid Shaikhet. Almost Sure Stability of Some Stochastic Dynamical Systems with Memory. *Discrete and Continuous Dynamical Systems*, **21** (2) (2008), 571-593.
- * Appleby, J.A.D., Mao X and **Rodkina, A.** Stabilization and destabilization of nonlinear differential equations by noise. *IEEE Transactions on Automatic Control.* **53** (3), April, 2008, 683-691.
- * Appleby, J. A. D., Berkolaiko G. and **Rodkina, A.** On local stability for a nonlinear difference equation with a non-hyperbolic equilibrium and fading stochastic perturbations. *Difference Equations and Applications*, **14**(9), (2008), 923-951.
- * **A. Rodkina** and G. Berkolaiko. Decay rate of moments of the solutions to difference equations with unbounded noises. Proceedings of the IX International Chetayev Conference Irkutsk, June 12-16. (2007), 373-381.
- * J.A.D. Appleby, M. Riedle and **A. Rodkina.** On asymptotic stability of linear stochastic Volterra difference equations with respect to a fading perturbation: *Difference Equations and Applications.* In: *Kyoto, Adv. Stud. Pure Math.*, Math. Soc. Japan. Tokyo, (2007) 8pp.
- * **Arunaye F.** Computing exact symmetries of dynamical systems from their reduced system of equations can be interesting. Pp.83-92, In: “Recent Advances in Systems, Communications and Computers”, April 6-8, 2008. Eds: Quing Li, S.Y. Chen, Anping Xu and Ming Li. WSEAS Press. www.wseas.org. ISBN: 978-960-6766-61-91.

- * **Arunaye F.** On the exact symmetries of dynamical systems from their reduced system of equations. *International Journal of Mathematical Models and Methods in Applied Sciences* Vol. 2(1), 2008, Pp. 176-185.
- * **Arunaye F.** Computing exact symmetries of dynamical systems from their reduced system of equations can be interesting II. *WSEAS Transactions on Mathematics*, Vol. 7(3), March 2008, 451-461.
- * **Arunaye F., H. White.** (2007) On the Ermanno-Bernoulli and Quasi-Ermanno-Bernoulli constants for linearizing dynamical systems. *International Journal of Applied Mathematics and Informatics*, Vol. 1(2), 2007, 55-60.
- * **Nagarani P.,** Sarojamma G. and Jayaraman G. “Effect of boundary absorption on dispersion in Casson fluid flow in an annulus” – Application to catheterized artery. *Acta Mechanica*, published online, 4th June, 2008. (10.1007/s00707-008-0013-y).
- * **Nagarani P.,** Sarojamma G. “Peristaltic transport of small particles – power law fluid suspension in a channel”, *Australian Physical and Engineering Sciences in Medicine*, 30(3), 2007, 185-193.

PUBLIC SERVICE

Dr. Conall Kelly

- Member, Mathematics Research Seminar Series
- Coordinator, Mathematics Bridging Programme
- Judge, UWI Mathematics Problem Solving Competition
- Member, American Mathematical Society
- Member, International Society of Difference Equations.
- Referee for – International Journal of Differential Equations, Neurocomputing, Stochastics, Journal of Computational and Applied Mathematics, and Journal of Mathematical Analysis and Application.

Winston St. Elmo Whyte

- Member, Government Pension Reform Committee.
- President, Caribbean Actuary Association.
- Member, Board of Management of M.A.J. Insurance Fund.
- Member, Board of Directors FIRM Insurance Brokers Limited.
- Member, Board of ACTMAN Internet Limited.
- Member, Board of Policy Holders Premium Finance Limited.
- Member, Board of Trustees of MACK D's Pension Fund.
- Chairman, Pensions Committee WIGUT.

COMPUTER SCIENCE SECTION

Dr. Daniel Coore – Section Head

WORK OF THE SECTION

The Section re-organised its first year courses, and created new second and third year courses for offer in 2008-2009. These include courses on Web application development and on network security. The courses on Web applications represent our response to a long-standing problem of not having this important area of the discipline taught within our undergraduate curriculum. One important element to our strategy for curriculum reform at both the undergraduate and graduate levels is to create courses that are directly related to the areas of expertise of the academic staff in the Section. This is expected to corroborate research efforts by staff members, and help in the recruitment of research students who are already orientated to their chosen area of study. The network security course is the first one to be created as a result of this deliberate strategy.

One of the aims of our curriculum strengthening exercises has been to provide the means for increased exposure of our students to industry professionals and practices. To that end, we have actively engaged with an increased number of companies to achieve this aim. In academic year 2006-2007, we negotiated with **Fujitsu** for them to offer training in certification courses that would augment our curriculum. The first cohort of that endeavour, comprised of 12 final year students, was run from January to April, 2008 and most of them were immediately recruited directly by **Fujitsu**. The Section has also engaged with **Jamaica National Building Society** to provide consultative services and software to automate certain labour intensive processes. The first project under that engagement started in mid-2008. The Section has also successfully engaged with a leading Costa Rican IT company, named **Avantica**, to offer 1 to 2 of our students an internship in Costa Rica. A pilot will run in late 2008, and in Summer 2009, and if successful, Avantica will continue to offer an internship on an annual basis.

PAPERS PRESENTED

Peer-reviewed Journal Articles

- **Ashley G. Hamilton-Taylor.** “A Paternalistic Cultural Philosophy of Educational Technology: E-Learning as a Panacea for the Developing World”. Seventh International ACS Conference, July 2008, UWI, Mona.
- **Ashley G. Hamilton-Taylor.** “Driva! Challenges in Inspiring Cultural Animation via Computer Science Education in Jamaica”. Global Reggae Conference, Feb 2008, UWI, Mona.
- **Ashley G. Hamilton-Taylor.** ‘New initiatives in Computer Science at UWI’ on Massachusetts Institute of Technology (MIT) campus radio, WMBR, by Carol Kirk. Jan 13, 2008.
- **Orrett Gayle, Daniel Coore.** (Accepted) “Self-organising text in an amorphous computing environment.” Unifying Themes in Complex Systems, Volume V and VI: Proceedings of the Sixth International Conference on Complex Systems. 2008.
- **Phillipa Bennett and E. K. Mugisa:** “Towards a Formal Model for Software Component Composition Using Whole-Part Theory”. In Hamid R. Arabnia and Hasan Reza (Editors) - Proceedings of the 2008 International Conference on Software Engineering Research and Practice (SERP 2008), July 14-17, 2008, Las Vegas, Nevada, USA, CSREA Press.
- **Eyton Ferguson and E. K. Mugisa:** “An Approach for the Incremental Certification of Software Components”. In Hamid R. Arabnia and Hasan Reza (Editors) - Proceedings of the 2008 International Conference on Software Engineering Research and Practice (SERP 2008), July 14-17, 2008, Las Vegas, Nevada, USA, CSREA Press.
- Benjamin Kanagwa, **E. K. Mugisa** and Th.P. Van Weide: “On Systematic Design of Service-Oriented Architectures”. In Hamid R. Arabnia and Hasan Reza (Editors) - Proceedings of the 2008 International Conference on Software Engineering Research and Practice (SERP 2008), July 14-17, 2008, Las Vegas, Nevada, USA, pages 374-381, CSREA Press.

- **Claudine Innis-Allen** and **E.K. Mugisa**: “A Flexible Taxonomy of Learning Objects based on Content Centric and Media Centric Approaches to Granularity”, in V. Uskov (editor)-Proceedings of the IASTED International Conference WEB-BASED EDUCATION, March 17-19, 2008, Innsbruck, Austria, pages 269-274, ACTA Press 2008.
- **S. Sankaranarayanan**. “Policy based Agent Architecture for Sensor based Mesh Networks-Health Care Monitoring”. Proceedings of High performance Computing Communications and Networking Conference (HPCNC). 2008.

PUBLICATIONS

Book Chapters

- * B. Kanagwa and **Ezra K. Mugisa**: A Comparison of Service-Oriented Architecture with other Advances in Software Architectures. In Joseph Migga Kizza, Jackson Muhirwe, Janet Aisbett, Katherine Getao, Victor Mbarika (Editors) Special topics in Computing and ICT Research, Volume 3: Strengthening the Role of ICT in Development, pages 405-416, Fountain Publishers, Kampala, 2007, ISBN 978-9970-02-730-9.
- * Agnes F. N. Lumala and **Ezra K. Mugisa**: Towards Compositional Support for a Heterogeneous Repository of Software Components. In: Joseph Migga Kizza, Jackson Muhirwe, Janet Aisbett, Katherine Getao, Victor Mbarika (Editors) Special topics in Computing and ICT Research, Volume 3: Strengthening the Role of ICT in Development, pages 446-453, Fountain Publishers, Kampala, 2007, ISBN 978-9970-02-730-9.
- * Paul Birevu Muyinda and **Ezra K. Mugisa**, Kathy Lynch: M-Learning: The Educational use of Mobile Communication Devices. In Joseph Migga Kizza, Jackson Muhirwe, Janet Aisbett, Katherine Getao, Victor Mbarika (Editors) Special topics in Computing and ICT Research, Volume 3: Strengthening the Role of ICT in Development, pages 290-301, Fountain Publishers, Kampala, 2007, ISBN 978-9970-02-730-9.

- * Nazir Ahmed Suhail and **Ezra K. Mugisa**: M-Learning: Implementation of E-Learning in Higher Educational Institutions in Low Bandwidth Environments: A Blended Learning Approach. In Joseph Migga Kizza, Jackson Muhirwe, Janet Aisbett, Katherine Getao, Victor Mbarika (Editors) Special topics in Computing and ICT Research, Volume 3 : Strengthening the Role of ICT in Development, pages 302-321, Fountain Publishers, Kampala, 2007, ISBN 978-9970-02-730-9.

Income Generation

The Computer Science Section generated a little over \$100,000 from its Summer School programme, and just over \$500,000 from the Computer Based MIS MSc programme which is offered jointly with the Department of Management Studies.

Awards

Gunjan Mansingh was a recipient of a New Initiative Grant, valued at \$350,000. The Section was pleased to grant the Dr. Karl Robinson Award, for the best performance in Computer Science courses up to Semester 1 of year 3 in the programme, to **Mr. Delano Thomas**.