DEPARTMENT OF MATHEMATICS

Professor Alexandra Rodkina, MPhil, PhD *Kiev,* **DSc** *Moscow*
– Head of Department

HIGHLIGHTS

Since August 2009, the Department of Mathematics has been operating as a single Department with Prof. Alexandra Rodkina being the Head. The Department's building is now undergoing a renovation exercise which commenced in July 2009.

Student Output

This year 41 students will be graduating with a major offered by the Department. The following data provides a breakdown by major:

Major	No. of Graduants (1st Class Honours)
Mathematics (Major)	12
Actuarial Science	18
Mathematics with Education	5

Information On Students

The following table indicates the number of Mathematics students registered by level and programme.

	Maths (BSc)	Actuarial Science	Maths with Education
Prelim.	216		
Level 1	36	28	1
Level 2	64	37	2
Level 3	54	25	2

Research Output

Since August 2008 to July 2009, the Department produced 13 articles in refereed journals, four conference presentations, three invited presentations and three Lecture Notes, among other teaching materials. A New Initiative Grant totalling approximately J$1,500,000.00 was approved for Dr. Conall Kelly to commence work on his research project titled *"Linear Stability Analysis of Numerical methods for Systems of Stochastic Differential Equations."* Dr. Nagarani Ponakala is also in receipt of a grant and is expected in 2010 to complete a research project on *Modelling the dispersion process in oscillatory flows with emphasis to cardiovascular system."*

In addition to the Department's monthly seminar, two research seminars on *"Stochastic Difference Equations"* and *"Ito formulas"* were held on a weekly basis for the graduate students.

PAPERS PRESENTED

Conall Kelly

- International Conference on Scientific Computation and Differential Equations, Beijing, China, May 2009.

- International ISAAC Congress, Imperial College, London, UK, July, 2009.

Sam McDaniel

- UWI's Conference "Food Security and Agricultural Development in the Americas", Jamaica, August, 2009. "A Statistical Approach to Estimating Agricultural Production in the Jamaican Context"

Alexandra Rodkina

- International ISAAC Congress, Imperial College, London, UK, July, 2009.

PUBLICATIONS

Refereed Journals

* **Kelly, Conall** and **Alexandra Rodkina.** Constrained Stability and Instability of Polynomial Difference Equations with State-Dependent Noise Discrete and Continuous Dynamical Systems, Series A, 11(4): 1-21, 2009, 913-933.

* Appleby, John A. D., **Conall Kelly**, Xuerong Mao and **Alexandra Rodkina**. Positivity and Stabilization for Nonlinear Stochastic Delay Differential Equations. Stochastics: An International Journal of Probability and Stochastic Processses,(8191): 29-54,2009.

* **Kelly, Conall** and **Kirk Morgan.** A Monte-Carlo approach to the effect of noise on local stability in polynomial difference equations. Matem`aticas: Ense`nanza Universitaria, 16(2): 3-10, 2008.

* **Ponakala, Nagarani,** G. Sarojamma and G. Jayaraman. Effect of boundary absorption on dispersion in Casson fluid flow in an annulus – Application to catheterized artery. *Acta Mechanica,* 202, 2009, 47-63.

* **Ponakala, Nagarani** and G. Sarojamma. Effect of body acceleration on pulsatile flow of Casson fluid through a mild stenosed artery. *Korea – Australia Rheology Journal,* 20(4), 2008 189-196.

* Appleby, John A.D., G. Berkolaiko and A. Rodkina. 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.

* Basin N. and **A. Rodkina.** On delay-dependent stability for a class of nonlinear stochastic systems with multiple state delays. *Nonlinear Anal*, 68(2008), no. 8, 2147-2157.

* Appleby, J.A.D. and **A. Rodkina.** Asymptotic constancy and stability in nonautonomous stochastic differential equations, Cubo, *A Mathematical Journal,* 10 (3), (2008), 145-159.

* Appleby, J.A.D., G. Berkolaiko and **A. Rodkina**. Non-exponential stability and decay rates in nonlinear stochastic difference equations with unbounded noise. *Stochastics:* An International Journal of Probability and Stochastic Processes, 81(2), 2009), 99-127.

* Appleby, J.A.D., **A. Rodkina** and W.L. Roeger. Stability of the limit cycle for a planar system with stochastic perturbations. Functional Differential Equations, {\bf 16}(1)(2009), 73-91.

* Appleby, J.A.D., J. Gleeson and **A. Rodkina.** On asymptotic Stability and Instability with respect to a Fading Stochastic Perturbations. Applicable Analysis, 88(4)(2009),579-603.

* **Solan,Ikhalfani.** A note on the derived Quotient of Certain Cyclically Presented Groups. Journal of Interdisciplinary Mathematics,11(4),(2008), August, 521-524.

* **Zhang, Wen-Bin.** Mean-Value theorem and Extensions of the Elliot-Dabaussi theorem on bearling's generalized integrals. Mathematics Zeitschrift (2009), 261-232. DOJ10.1007/s00209-008-0309-6.

PUBLIC SERVICE

Dr. Nagarani Ponakala
– Reviewer, for *Applied Mathematics and Computation, Mathematical Bioscience, Applications and Applied Mathematics*.

Dr. Conall Kelly
– Reviewers, for *Computers and Mathematics with Applications, Discrete and Continuous Dynamical Systems, Applicable Analysis, Stochastics, Mathematical Problems in Engineering* and *Automatica.*

Prof. Alexandra Rodkina
– Editor, *International Journal of Difference Equations.*

– Reviewers, for *Computers and Mathematics with Applications, Discrete and Continuous Dynamical Systems, Applicable*

Analysis, Stochastics, Mathematical Problems in Engineering and *Automatica.*

Dr. Sam McDaniel
  – Consultant, Statistical and Data Collection, Ministry of Agriculture and Fisheries

Mr. Winston St. Elmo Whyte
  – Chairman, WIGUT Pensions Committee
  – Advisor, (Mona) Health Committee
  – Member, Boards of FIRM Insurance Brokers
  – Member, ACTMAN International Limited
  – Member, Government Pension Reform Committee
  – President, Actuarial Association (JM)
  – Member, Council of the International Actuarial Association

Dr. Raymond McEachin
  – President, Advisory Board, Middleton, Redlight-Irish Town Learning Centre

OUTREACH

The Department was well represented at both the Western and Eastern Fairs, organized by the University and the Faculty of Pure and Applied Sciences. The result is not only a record number of intakes in the Department but also in the Faculty.

We continue to work with and monitor a number of Community Colleges that offer our Preliminary Mathematics courses. A consequence of this is a review of the generally low pass rate among the Community Colleges. We have begun to address this situation by forwarding weekly problem papers and worksheets to these institutions. In the coming year, we will be making recommendations to ameliorate our relationship.

Summer School

The Department's summer school, which was coordinated by Dr. Sam McDaniel, offered seven courses.

Mathematics Bridging Programme

The Mathematics Bridging Programme, which is coordinated by Dr. Conall Kelly, began in August 2008. In its first year, the programme did not attract as many students as expected. The reasons for that were analyzed and the programme has been significantly revised. This year, before starting the programme, the students were asked to pay the full programme fee of J$6,000.00. Several scholarships from UNESCO were made available to students who expressed an interest in the programme but could not afford to pay.

Mathematical Olympiad

Since the inception of the Mathematical Olympiad in December 2008, Dr. Raymond McEachin has served as its Coordinator. He organized a Pilot Olympiad featuring activities including five problem solving workshops for teachers who participated in the pilot project, two Pilot Olympiad Competitions and a Planning and Design Workshop in May 2009. Dr. McEachin is responsible for coordinating our Department's activity which has to lead to the selection of a Jamaican Mathematical Olympiad Team.

Research Day

Research Day preparation in 2009 was coordinated by Miss Yvette Johns. She also designed the posters, flyers, Math and Actuarial programmes brochures. Prior to the research day, a mathematics competition for 2nd and 3rd year students was held. The winners were awarded at the Departmental Booth. Short quizzes for students were conducted at the booth for two days and attracted a lot of students. Presentations on research and career were given at the Department.

MSc Programme

Plans to resume the MSc in Mathematics Programme was discussed and prepared during 2008/09. In order to attract more students to the programme, it was decided to offer several qualifying courses in Semester I of 2009/2010 in order to start the programme in January 2010. Twenty students have received an offer to do two qualifying courses in semester I and ten more are fully qualified to start the MSc programme in Semester II.

Curriculum Revision

In 2008/09, curriculum revision of mathematical undergraduate programme has started but has not been completed. The list of courses which is supposed to be taught for M.Sc. has not been enriched as yet. However, a lot of preliminary work was done to ensure that the new undergraduate programme for mathematical major and minor, as well as the new MSc. Option – Mathematical Modelling will be approved in 2009/2010.

Staffing

Professor Wen-Bin Zhang has retired and Dr. Ikhalfani Solan has resigned at the end of academic year 2008/2009. Dr. David Batic got an offer of lecturer position and should commence duties in November 2009.

UNESCO Projects

The Department has prepared the draft of the project for UNESCO: "Mathematical Intervention into the Caribbean." Based on the funding of this project, there is a strong probability that funds from the project will be used to support the Bridging Programme and the Mathematical Olympiad in Semester I.

Student Achievement

Two of our graduate students, Mrs. Alphonsa Mathew (supervisors: Prof. A. Rodkina and Dr. I. Solan) and Mr. Kirk Morgan (supervisors: Prof. A. Rodkina and Dr. C. Kelly) obtained their MPhil degrees in November 2009. PhD candidate, Mr. F. Arunaye (supervisors: Prof. A. Rodkina, and Prof. Bhatt, St. Augustine campus) recently submitted his PhD thesis.

Three undergraduate students namely; Kervern James, Geoffery Romans and Pedro Medford were recipients of the Mathematics Prizes.

Visit of Professor Michael Kovalyov

In February 2009, Prof. Michael Kovalyov from University of Alberta, Edmonton, Canada, presented a paper at one of our Departmental Seminars.