DEPARTMENT OF MATHEMATICS

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

HIGHLIGHTS

As at August 2012, the teaching staff of the Department of Mathematics comprises of two Professors, four senior lecturers, five lecturers, four assistant lecturers. Among them we have seven members of staff with PhD (one, in addition to PhD, has a Higher Doctorate degree), one person is a Fellow of the Canadian Institute of Actuaries (UK) and the other is a fellow of the Institute and Faculty of Actuaries (UK).

This year (2012/2013), in keeping with the curriculum reform of the faculty, the Department has started teaching the following approved 3-credits second year courses in Semesters 1 and 2.

MATH2330	Engineering Mathematics II
MATH2401	Elements of Mathematical Analysis
MATH2404	Introduction to Probability Theory

MATH2410A	First Course in Linear Algebra
MATH2421	Fourier Series and Integral Transforms
MATH2430	Linear Optimization
MATH2701	Financial Mathematics I
STAT2001	nferential Statistics
MATH2403	Multivariable Calculus
MATH2407	Stochastic Modelling
MATH2411	Introduction to Abstract Algebra
MATH2420	Ordinary Differential Equations
MATH2431	Non-Linear Optimization
MATH2702	Actuarial Mathematics I

The Department has continued its collaboration with various departments in the Faculty and continues to offer Mathematics courses to suit their needs such as MATH1185 which was tailored to suit Chemistry & Physics students, COMP1110, that was tailored to suit Computing students and MATH1180 and MATH2330 that was tailored for Engineering students.

We have proposed for approval to the Academic Quality Assurance Committee (AQAC) a revised programme entitled "BSc Mathematics with Education Studies "as well as a new programme entitled "BSc in Statistical Science'' that were approved this summer. These programmes are expected to be offered in the upcoming academic year 2013/14, along with our other recently approved programmes entitled "BSc Mathematics (major & minor), BSc Actuarial Sciences and BSc Mathematics & Modelling Processes".

For the academic year 2012/13 a total of 1,350 students registered for all level courses in the department. As long as our staff-complement remains and the student numbers continue to increase, we remain in a less than desirable position with higher than acceptable students/staff ratio being for preliminary level 121:1; level 1 137.4:1; level 2 – 33.57:1 and for level 3 – 20.17: 1.

RESEARCH

During the year 2012/13 we continue to increase our research activity within the Mathematics Department.

RESEARCH VISITS

- 2013 July, University of Calgary, Canada, Professor A. Rodkina,
- 2013 January, May–July, Virginia Commonwealth University, Ms. Sekayi Campball
- 2012, September–October, Curtin University, Perth, Australia, Professor A. Rodkina

ATTENDED CONFERENCES

- Mr. Ajani Ausaru attended the 4th Congress on Industrial, Computational and Applied Mathematics, May, 2013, Buenos-Aires, Argentina.

Conference presentations:

Dr. Conall Kelly presented papers

- "Stochastic effects in non-normal systems: an Example from ecology" at SIAM Conference on Applications of Dynamical Systems, May 2013, Snowbird Ski and Summer Resort, UT, USA.
- "Non-normal drift structures and linear stability analysis of numerical methods for systems of stochastic differential equations", Numerical Solution of Differential and Differential – Algebraic Equations (NUMDIFF-13), September 2012, Martin-Luther-University Halle-Wittenberg, Halle, Germany.
- **Professor G. Jayaraman** gave two lectures on "Mathematics in Medicine" and "Modelling Marine Ecology" at the Indian Women Mathematicians Conference, Pune, India, July 26–28, 2013.

PUBLICATIONS

Published papers

- **C. Kelly**, Peter Palmer and **Alexandra Rodkina**, Almost sure instability of the equilibrium Solution of a Milstein-type stochastic difference equation. *Computer & Mathematics with Applications*, http://dx .doi.org/10/1016/j.camwa.2013.06.020 (2013).
- Evelyn Buckwar and **Conall Kelly**, Non-normal drift structures and linear stability of numerical methods for systems of stochastic differential equations. *Computers & Mathematics with Applications*. 64:7 (2012), pp. 2282–2293.
- Braverman, L. **Rodkina, A.** On difference equations with asymptotically stable 2-cycles perturbed by a decaying noise, *Computers and Mathematics with Applications*, 64(7)(2012), 2224, 2232.
- E. Braverman, **A. Rodkina,** Stabilization of two-cycles of difference equations with Stochastic perturbations, *Journal of Difference Equations and Applications* (2013), Vol. 19, No. 7, 1192–1212.
- **Dr. Batic,** R. Williams and M. Nowakowski, Potentials of the Heun class, *Journal of Physics A: Mathematical and General*. 46 245204-(2013). (Impact Factor: 1.766).
- **Dr. Batic**, N. Kelkar and M. Nowakowski. Orbiting phenomena in black hole scattering, *Physics Review D*. 86 104060(2012) (Impact Factor: 4.56)
- G. Senthil and **G. Jayaraman**, Flood inundation simulation in river basin using a shallow Water model: application to river Yamuna, Delhi region, *International Journal of Advances in Engineering Sciences and Applied Mathematics*. 4,250-259, 2012 [DOI 10.1007/s12572-012-0053-3]
- N. Kaushik, B. Tyagi and **G. Jayaraman**, Modelling of the dissolved oxygen in a river with Storage zone on the banks, "Applied Mathematics". 3, 699–704, 2012.
- P. Nagarani and B.T. Sebastian: Dispersion of a solute in pulsatile non-Newtonian fluid through a tube, "*Acta Mech*" 2013, 224:571–585.

ORGANIZATION OF WORKSHOP AND CONFERENCE

- Dr. Batic organized together with Professor Rodkina and Dr. Kelly, the First School in Applied Mathematics at UWI from December 3–5, 2012. We had participants from the St. Augustine Campus as well as from the University of Los Andes (Bogota, Colombia)

OUTREACH

The department for the first time experimented with a workshop for students doing CAPE exams. We are happy to say it was successful. Students from as far as Frome High School in Westmoreland participated.

Additionally the Faculty Office invited the department to conduct CSEC tutorials for students of Port Antonio High in May 2013. Both postgraduates and undergraduate students participated.

Dr. McDaniel, on the invitation of the Mona High School, hosted a CSEC Mathematics workshop.

COMMUNITY SERVICE

- Dr. Ponakala Nagarani acted as the Independent External Examiner for PhD thesis of Curtis Boodoo, May, 2013, UWI, St. Augustine
- Professor Jayaraman acted as the External Examiner for the PhD thesis "Modelling Crime" in the Department of Mathematics, St. Augustine on May, 2013.

PUBLIC SERVICE

Ms. Sekayi Campbell

– Member, Universal Services Fund board for the academic year 2012/13.

STUDENTS

The department has graduated an average of 57 BSc students per year with a major or minor in Mathematics, Actuarial Science Option, Mathematics with Education Option, Mathematics with Economics and most recently double major in Mathematics & Modelling Processes.

Since 2008 to 2012, a total of 285 students graduated from the department. This is broken down as follows:

2008	2009	2010	2011	2012
55	48	52	68	62

This year a total of eleven students graduated with First Class Honours degree.

Information on Students

The number of students graduating in each programme over the last five years is shown below:

Year	Math	Actuarial Sciences	Math/ Edecation	Math/ Econ	Math/ Modelling	Total
2008/09	18	29	2	6	–	55
2009/10	20	21	–	7	–	48
2010/11	7	35	1	9	–	52
2011/12	18	33	2	15	–	68
2012/13	18	26	6	10	2	62

For the 2012/13 academic year the total number of registered undergraduate students is as follows:

Preliminary level	363
Level I	687
Level II	201
Level III	89

SUMMER SCHOOL

The department offered 30 courses for summer 2013, some of which were to facilitate students who needed to graduate as well as to facilitate the curriculum reform.

INTERNSHIP

This summer the department continued with the Internship Programme for the Actuarial students placing eight of our students into various organizations throughout the corporate areas.

MATHEMATICS BRIDGING PROGRAMME

For the 2012/13 academic year, the Mathematics Bridging programme commenced in the 3rd week of the semester. The programme ran for 9 weeks with 14 students participating. A Diagnostic test was given to the participants. There was an overall improvement in students who participated by the end of the programme. As there were issues with the Bridging Programme being offered during club activities on Thursdays, it was suggested that a trial run be done in summer to ascertain if more persons would participate at that time instead. Overall, the programme was a success.

MATHEMATICAL OLYMPIAD

The Department of Mathematics organized two Olympiad programmes last year. The Junior Mathematical Olympiad was held in three rounds

for students in Grades 4, 5, and 6. The Jamaican Mathematical Olympiad was held in four rounds for students in Grades 7 through 11. A total of 3108 students entered these competitions, a 30% increase over the year before. The department also took a team of three students to an international mathematics competition, called the Central American and Caribbean Regional Mathematical Olympiad. Two students won Honourable mention in the competition. They became the first Jamaican students ever to win awards at an international mathematics competition.

ACTUARIAL SOCIETY

Throughout the academic year 2012/2013, the UWIAS welcomed special guests from the actuarial and other corporate arenas to share useful knowledge with the students. The group was graced by the likes of the young and insightful Ricardo Allen, Structured Product Analyst at Sagicor Investments Jamaica Limited. Norbert Fullerton, Fellow of the Institute of Actuaries, visited from the United Kingdom to share his views on the skill set needed to become a successful actuary. He also gave insight about the market for actuarial science graduates from an international perspective. The most successful assembly was an informative panel session about actuarial examinations, conducted by representatives from the Society of Actuaries (Ken Guthrie and team). They brought along Jamaican fellows of the SOA in the persons of Michael McLaughlin, Mrs. Janet Sharp and Willard Brown. Finally, as a follow up to his "Moments of Truth" presentation at the Annual Awards Dinner, Mr. Ravi Rambarran (Chief Executive Officer – Sagicor International) conducted a question and answer session, which sparked discussions regarding the attitude required throughout the journey to becoming a qualified actuary.

GRADUATE PROGRAMMES

MSc Enterprise Risk Management

In 2012/2013 we took in the first cohort of our new self financed programme. A total of 16 students were registered.

MSc Mathematics Programme

A total of 7 students graduated from the programme in November 2012. This is the first group of graduates since restarting the MSc in 2010. A further two students completed the requirements for the programme in 2012/13 academic year and are expected to graduate in November 2013.

The third intake to the MSc Mathematics will occur in January 2014, with a semester of qualifying courses scheduled to run in Semester 1 of the 2013/14 academic year.

MPhil and PhD Programmes

Research Students

During the 2012/13 academic year there were 3 MPhil students and 3 PhD students registered in the department:

Peter Palmer submitted his PhD thesis, entitled "Almost Sure Asymptotic Stability of the Equilibria of Discretisations of Stochastic Differential Equations" which is now under examination. He also published a paper together with Professor A. Rodkina and Dr. C.Kelly.

Binil Sebastian presented at a workshop and published one journal article with Dr. N. Ponakala. Her presentation is: "Effect of Oscillation on Dispersion on a Casson Fluid in an Annulus", Workshop on First School of Applied Mathematics, UWI Mona, Jamaica, December 3–5, 2012.

Andre Small – working on Peristaltic transport for his M.Phil since the year 2012–13.

Runako Williams visited the University of Los Andes (Bogota, Colombia) from January 2013 to May 2013. During that period, he gave tutorials for the course Multivariable Calculus and took courses in Algebraic Geometry and Differential Geometry. He actively participated in the seminar "Introduction to semi-groups" organized by Professor Winklmeier and in another seminar offered by Professor Malakahltsev. He submitted

his M.Phil thesis "Two points connection problems for Fuchsian ordinary differential equations in the complex plane" in July 2013. Runako Williams has been accepted for the one-year graduate programme in Mathematics at the ICTP (Trieste, Italy) where he already started the programme from September 2013.

Dujon Dunn submitted his M.Phil thesis entitled "Noncommutative Geometry inspired Minkowski space-time" in July 2013.

Kirk Morgan was asked to do qualifying courses before starting his research under the supervision of Dr. Batic. He was successful and passed both courses – "Metric Spaces and Topology" and "Introduction to Partial Differential Equations". He has already started his research on the topic "Exotic space-times".