DEPARTMENT OF MATHEMATICS

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

HIGHLIGHTS

As at July 2011, the teaching staff of the Department of Mathematics comprises of 1 Professor, two senior lecturers, six lecturers, and three assistant lecturers. Among them we have six members of staff with PhDs (one , in addition to PhD, has a Higher Doctorate degree), one person is a Fellow of the Canadian Institute of Actuaries, and a Fellow of the Society of Actuaries, and one person is a Fellow of Institute of Actuaries (UK).

This year (2011/2012), for the first time, students at this level will be required to read 3-credit courses as stipulated by the Faculty in their curriculum reform. To move on to level-two Mathematics, students will be required to be successful in four specified courses: MATH1141 (for all FPAS students), MATH1142, MATH1151 and MATH1152. Two to be taken in each semester. In addition to these courses, the Department will be offering first year courses tailored to the needs of the Physics and Chemistry Departments. In particular, MATH1185 was designed and will be adopted by students wishing to pursue Chemistry and/or Physics. To further service the Faculty of Pure and Applied Sciences, we will be offering a first year statistics course, STAT1001. This course will be open to all students in the faculty wishing to pursue some statistics. The Department is also in the process of establishing connection with the business sector in particular, to create internships for the Actuarial programme. We have also obtained and installed mathematical software in the students' computer lab such as Maple, LaTEX and "R".

We have submitted the second level 3-credit courses for approval and they should be taught starting September 2012.

As long as our staff-complement remains and the student numbers continue to increase, we are stuck in a less than desirable position with higher than acceptable students to staff ratios. Recently, the Department tried to address this problem at level one by introducing a new (third) stream. The current average ratios for Semester I from level zero to level three are 1:114, 1:89: 1:94 and 1:87 respectively. For Semester II the current average ratios from level zero to three are 1:94, 1:87, 1:84 and 1:39 respectively.

At our recent Departmental Retreat, it was decided that the major should be reduced to 36 minimum credits from 60 minimum credits, based on the Faculty's new curriculum reform.

During the years 2006-2011, a high level of research activity was sustained within the Department of Mathematics at the University of West Indies.

There are three well developed areas of research in the department: Stochastic Analysis, Physiological fluid dynamics and Mathematical physics. In addition, some research has been done in Statistics and Actuarial Science.

The research of the department was recognized by substantial support from the UWI New Initiative Programme and Mona Research Fellowship. Additional external research support came from UNESCO, London Mathematical Society and Canada-CARICOM Leadership Programme.

SUMMER SCHOOL

The department offered fifteen courses for summer of 2011; three of which were for students doing exams only. Overall, we had a successful summer school.

SEMINARS

The department hosted a number of seminars during the academic year 2010/11. In November 2010, at the invitation of Dr. Davide Batic, two international seminars were held. Professor Marek Nowakowski Departamento de Fisica, Universidad de los Andes, Bogota D.C., Colombia and Prof. Neelima Kelkar Departamento de Fisica, Universidad

de los Andes, Bogota D.C., Colombia presented on the following topics respectively: "Spontaneous decay of matter in quantum mechanics" and "Quantum Clock of Radioactive Decay".

OUTREACH

The department continues in its external outreach activities. The CSEC workshops were arranged for students sitting the regional examinations. The outreach programme is not limited to local high schools but include those in the western parts of the island. The Department conducted workshops at the William Knibb High School and students from neighbouring schools participated. Other outreach activities were conducted at events such as UTECH Career Fair, St. Andrew High School for Girls Career's Day Expo and at the Denbigh Agricultural Show where the department was showcased.

MATHEMATICS BRIDGING PROGRAMME

The Mathematics Bridging Programme has been set up to improve the mathematical skills of students entering the faculty. It is structured to give students a self-paced non-traditional experience in a small group setting.

This year the number of students registered for the programme is 36, one more than last year. The Bridging programme is scheduled for eight weeks in semester 1 starting the third week of the new academic year. Students are required to spend two hours per week in a self-directed learning experience with qualified tutors. At the end of the programme, students will have a clearer understanding of the course and the programme and are encouraged to get further assistance through independent study.

For participants who sat the entry and exit diagnostic tests for the programme, the average improvement in the exit test was 74% of their score upon entry.

MATHEMATICAL OLYMPIAD

The Department of Mathematics ran the annual Mathematical Olympiad project for two years. In 2010-2011 academic years the Mathematical

Olympiad was sponsored by Sterling Asset Management Limited, University of the West Indies, Mona and several other companies.

In 2011, the department ran the Vivian Rochester Junior Mathematical Olympiad, which was sponsored by University of the West Indies and the Insurance Association of Jamaica (IAJ). A total of 380 students in Grades 4, 5 and 6 took up this challenge.

After assessing the Qualifying Round scripts the best performers were invited to participate in the First Round examination. A total of 229 students from 17 schools sat this exam. After completing the competition, the Department of Mathematics determined the National Mathematical Champions for each Grades 4, 5 and 6.

RESEARCH DAY

Research Day 2011 was filled with activities. The Mathematics Department hosted a math competition, where we had spot quizzes, prizes and a slide show. The winners were recognised at the booth.

PAPERS PRESENTED

Special Presentation

Prof. Alexandra Rodkina

- "Discretized Ito Formula and Stability of Stochastic Difference equations", Probability Seminar, Texas A & M University, U.S.A., 2011.

Conference Presentation

Dr. Conall Kelly

- "Destabilising effects in linear stochastic systems and the theta-Maruyama method", The International workshop "Progress on Difference Equations", May 2011, Dublin City University, Ireland.

Prof. Alexandra Rodkina

- "Application of Discretized Ito Formula to Stability of the Systems of Stochastic Difference equations ", The International workshop "Progress on Difference Equations", May 2011, Dublin City University, Ireland.

Dr. Nagarani Ponakala

- with Nagarani P, and Sebastian B. "Effect of Flow oscillation on dispersion of solute in a tube". The International conference on Applied Mathematics, Modelling and Computational Science, July 25-29, 2011, Waterloo, Canada.

PUBLICATIONS

Refereed Journals

* Appleby, J.A.D., **Kelly C**. and **Rodkina A.** "On the use of adaptive meshes to counter overshoot in solutions of discretised nonlinear stochastic differential equations". *International Journal of Difference Equations* 5, *(2010*), 129-148.

* Appleby, J.A.D. Guzowska, M., **Rodkina A.** and **Kelly C**. "Preservation of positivity in the solution of discretised stochastic differential equation". *Applied Mathematics and Computation* 217, (2010), 763-774 (IF=1.534).

* Buckwar, E. and **Kelly C.,** "Towards a systematic linear stability analysis of numerical methods for systems of stochastic differential equations". *SIAM Journal on Numerical Analysis* 48, (2010), 298-321 (IF=1.632).

* Arunaye, F.I., Bhatt B.S. and **Nagarani P.,** "On the solution of the convective-diffusion equation". *International Journal of Pure and Applied Mathematics* 68 (2011), 37-53**.**

* Arraut Guerrero, I., **Batic D**. And Nowakowski M., "Velocity and velocity bounds in static spherically symmetric metrics". *Central European Journal of Physics* 9, (2011), 926-938 (IF=0.691).

* **Batic D**., Kelkar N and Nowakowski M., "Comment on Quasinormal modes in Schwarzschild-de-Sitter spacetime: A simple derivation of the level spacing of the frequencies*". Physical review D 83,* (20100), 108501-04, (IF=4.964).

* **Batic D**., Chin D. And Nowakowski, M. "The repulsive nature of naked singularities from the point of view of Quantum Mechanics". *European Physics Journal C 71,* (2011), 1624-31, (IF=3.248).

* Angulo Santacruz, C., **Batic D.** and Nowakowski M., "On the existence of the Schwarzschild spacetime inspired by noncummutative geometry". *Journal of Mathematical Physics* 51, (2010), 022503-20 **(**IF=1.291).

* **McDaniel S.A.,** and Cai T., "Assessing Population Level Genetic Instability via Moving Average"*, Statistics in Biosciences 2,* (2011), 120-36, (IF=0.000).

Referred Conference Proceedings

* Appleby J.A.D., McCarthy **M., Rodkina A**. "Exact growth rates of solutions of delay dominated differential equations*"*, Vol. Proceedings of Neural, Parallel and Scientific Computations **IV,** (2010), 37-42.

* Appleby, J.A.D., Cheng J., and **Rodkina A.,** "The split-step Euler-Maruyama method preserves asymptotic stability for simulated annealing problems", Vol. Proceedings of Neutral, Parallel and Scientific Computations IV (2010), 31-36.

Books and Chapters in Books

* **Kelly C, and Rodkina A.,** "On Stochastic Difference Equations and Applications. In the electronic book Springer Encyclopaedia of Statistics (2010).

* **McDaniel S**. "CAPE-ONE Mathematics (Module 01), Academic Solutions (2010)". ISBN: 978-976-95315-0-5.

* **McDaniel S.**, "Cue Cards and Multiple Choice Questions for CAPE-ONE Mathematics, Academic Solutions (2010)", ISBN: 978:97695315-1-2.

FUNDING OF RESEARCH

The UWI New Initiative Grant for project titled *"Mathematical aspects of quantized spacetimes"* was given a grant of JMD 1,153,989.00 to **Dr. Batic**. The project started September 1, 2011 and ends August 31, 2012.

External support of GBP 2,500 was given to Dr. C. Kelly for Project titled: *"Interaction of drift and noise structures in systems of stochastic ordinary differential equations arising from the spatial discretisation of stochastic partial differential equations: implications for numerical methods"*, May 16 - June 24, 2011.

Canada-Caricom Leadership Scholarships Program supported a research visit of Prof. A.Rodkina to the University of Calgary, August 2010 and was given a grant of CAN$3,000.

STUDENTS

The department has recognised outstanding students' achievement. Two undergraduate students - Mr. Dujon Dunn and Mr. Everett Moseley participated in a Mathematics Competition and were awarded prizes that were presented to them at the annual Research Day. Scholarships were awarded to outstanding students in Academics achievements as follows:

Merville Campbell Prize for Level I and Level II	**Timar Jackson** **Tashi Fung**
The Harold Chan Scholarship in Mathematics	**Runako Williams**
University Lodge/Leslie Robinson Prize	**Mr. Donald Burrell**
Actuarial Society Awards	**Johnathan Craig** **Tashai Fung**

Information on Students

This year 52 students will be graduating with a major offered by the Department. The following data provides a breakdown by major:

Major	No. of Graduants
Mathematics	7
Actuarial Science	35
Mathematics with Education	1
Mathematics with Economics	9

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

Levels	Mathematics	Actuarial Science	Math with Education
Preliminary Level	265	-	-
Level 1	335	127	3
Level 2	174	57	2
Level 3	33	38	2

Graduate Programmes

MSc Mathematics

The MSc Mathematics was restarted as a part-time 2-year programme in Semester 2 of 2009/10. Thirteen registered students are currently on the books. At the time of writing, applications are being accepted for new intake in Semester 1, 2011/2012, after which it is anticipated that the programme will run every 2 years.

MPhil/PhD

The department currently has 2 registered students for MPhil and PhD with 3 more to start in September 2011.