

## DEPARTMENT OF MATHEMATICS



Dr. Conall Kelly, BSc, PhD, *Dublin City University*  
Head of Department

### WORK OF DEPARTMENT

During the year 2016–17, the Department of Mathematics submitted and received approval from the Board for Undergraduate Studies (BUS) for the **revised BSc Programme, Mathematics with Education Studies** to be offered at the start of the academic year 2017/18. The Department continues to collaborate with various departments in the Faculty, offering courses to suit the needs of the students.

The Department has recently suffered losses to its academic staff complement. Dr. Peter Palmer and Ms. Kimberly Boswell departed last year while Dr. Davide Batic departed effective January 1, 2017. Dr. Conall Kelly completes his term as a Head and will leave the Department effective July 31, 2017. In the 2016/17 academic year, Professor Alexandra Rodkina was awarded the status of Professor Emerita demitting the teaching staff of the department effective August 1, 2017. These losses

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have restricted the ability of the department to offer a sufficiently wide selection of elective courses, particularly at Level III and the Graduate Level, have required the cancellation of streams in some instances and have led to increasing class sizes of Level I and II courses. The department has advertised for three positions during the 2016/17 academic year and as of August 2017, three offers have been made.

The Department was honoured this year when it was given approval to host the **CIMPA** Research School under the theme “Representation Theory and Applications to Differential Equations”. This was held January 9–20, 2017 and coordinated by Dr. Dmitry Malinin and team. The Department hosted a number of International presenters and students. Short courses and research talks were delivered by 16 speakers. These were well received and the feedback from the participants was excellent.

Dr. Nagarani Ponakala, received the **TWAS-CAS Young Scientist Award** for 2016 jointly sponsored by The World Academy of Sciences (TWAS) and Caribbean Academy of Sciences (CAS). In the same year, she also received the **special award** from the Faculty of Science and Technology in response to her international recognition by Inter-American Network of Academics of Science (IANAS) as Young Women Scientist for the previous year. Dr. Conall Kelly, was awarded the **Most Outstanding Researcher** in the Faculty of Science and Technology by the Principal, UWI, Mona, in February 2017.

The Department held its 4th Annual Mathematics **Career Fair** in Chemistry Lecture Theatre 6, November 25, 2016. A total of 69 students registered, of which 31 participated. The companies which participated were: Victoria Mutual Building Society, Bank of Nova Scotia, Sagicor Life Jamaica Limited, Financial Services Commission and Jamaica Stock Exchange. The feedback received from both students and companies was commendable.

The Department of Mathematics has a formal **Internship Programme** which was piloted in the 2011/12 academic year. The programme places suitable students with qualified employers in financial services, regulatory

services and consulting amongst other fields for the summer period. Launched on the May 25, 2017, with an orientation seminar, the programme received 56 applications from which 15 students were placed.

The Mathematics **Bridging Programme** has been a feature of the Mathematics Department in the Faculty of Science and Technology since 2009. Over the past few years this programme has been coordinated by Mr Ajani Ausaru. The programme sets out to prepare students for the rigors of university level mathematics by reinforcing their basic mathematical skills. With the support and guidance of highly-qualified tutors, students work intensively in a group of no more than six. For the academic year 2016–17, 19 students registered for the programme. Some students were quite consistent in their attendance, and others sporadic (in particular after the midterm exams started). The students appreciated the classes and showed keen interest. The program ran for 9 weeks.

The Department of Mathematics organizes two national mathematics competitions annually. These are sponsored by the Office of the Principal at the UWI, Mona Campus and coordinate by Dr. Raymond McEachin.

The first competition is the **Jamaican Mathematical Olympiad**. This is a competition for high school students throughout the country. In the 2016-17 school year, a total of 1658 students from high schools entered the Olympiad. After the final national championship round, the Department selected a team of three students to represent Jamaica in the Central American and Caribbean Mathematical Olympiad. It was held from June 14–22, 2017, in San Ignacio, El Salvador. Jamaica placed 8th out of 14 participating countries. Although no student won a medal this year, each one earned an Honourable Mention.

The **Junior Mathematical Olympiad** is a competition for students in Grades 4–6 throughout Jamaica. In the 2016–17 school year, a total of 5,904 students from 156 schools participated. This was held in three rounds. After the final round the Department named national champions and bestowed Honourable Mentions and Merit Awards on the top 10% of the competing students.

## PRESENTATIONS

### Invited Talks

- **A. Rodkina**, Stochastic difference equations with the Allee effect, The 23rd International Conference on Difference Equations and Applications, Timisoara, Romania, July 24–28, 2017
- **A. Rodkina**, The International Conference – Analysis and Partial Differential Equations, Imperial College, London, UK, September 25–30, 2016.
- **C. Kelly**, *Introduction to stochastic difference equations*, CIMPA School held in at the University of the West Indies, Mona Campus, under the theme Representation theory and Applications to Differential Equations, January 9–20, 2017.
- **C. Kelly**, *Stabilisation of positive equilibria in population models with noisy prediction based control*, Probability Seminar, Department of Mathematics, April 2017, Texas A&M University, Texas, USA.
- **D. Malinin**, *Integral representations*, CIMPA, UWI, Mona, January 9–20, 2017.
- **D. Malinin**, On the arithmetic of integral representations, Spa, Belgium, Groups, Rings and the Yang-Baxter Equation, June 23, 2017.
- **N. Ponakala**, Study of unsteady convective diffusion in an annulus, International conference on Fluid Dynamics and its applications, B.N.M. Institute of Technology (BNMIT), Bangalore, July 12–14, 2017
- **N. Ponakala**, *Mathematical Modeling of Physiological flows*. CIMPA, UWI, Mona, January 9–20, 2017
- **N. Ponakala**, *Understanding Physiological Situations with Modelling* at the Caribbean Academy of Sciences 20th general meeting and Biennial conference 24th–26th November 2016, Guadeloupe.

## PUBLICATIONS

### Journal Papers

- E. Braverman, **A. Rodkina**, “Stochastic difference equations with the Allee effect”, *Discrete and Continuous Dynamical Systems – Series A*, Vol. 36, 11 (2016), 5929–5949, DOI:10.3934/dcds.2016060.
- E. Braverman, **C. Kelly, & A. Rodkina**, “Stabilisation of Difference Equations with Noisy Prediction-Based Control”, *Physica D: Nonlinear Phenomena* 326 (2016) 21–31, DOI: 10.1016/j.physd.2016.02.004
- E. Braverman, **A. Rodkina**, “Stabilisation of Difference Equations with Noisy Proportional feedback control”, *Discrete and Continuous Dynamical Systems – Series B*, (2017) 22(6), 2067-2088, doi:10.3934/dcdsb.2017085.
- **Cónall Kelly** and Gabriel Lord, “Adaptive timestepping for nonlinear stochastic systems”, *IMA Journal of Numerical Analysis*, (2017), Preprint available at <https://arxiv.org/abs/1610.04003>.
- M. Tessarotto, M. Mond, and **D. Batic**, “Hamiltonian structure of the Schrödinger classical dynamical system”, *Found. Phys.* 46 (2016), no. 9, 1127–1167.
- **D. Malinin**, “The integral and globally irreducible representations of finite groups”, *Journal of Algebra and its Applications*, (2017).
- **P. Nagarani** and B.T. Sebastian, “Effect of flow unsteadiness on dispersion in Non-Newtonian fluid in an annulus”, *J. Appl. Math & Informatics*, 35(2017), no. 3-4, 241-260. <https://doi.org/10.14317/jami.2017.241>.

### Refereed Conference Proceedings

- Marneni Narahari, S. Suresh Kumar Raju and **P. Nagarani**: “Joule heating effects on unsteady natural convection flow near a moving semi-infinite vertical plate with variable heat flux and mass transfer”, *AIP Conf. Proc.* 1787, 020005 (2016); <http://dxdoi.org/10.1063/1.4968054>

## **PUBLIC SERVICE**

### **A. Rodkina**

- A reviewer of Zentralblatt für Mathematik – Mathematics Abstracts.
- Reviewed papers for several of international mathematical journals, including: Stochastic and Stochastic Reports, Dynamics of Discrete and Continuous Systems, *Journal of Applied Mathematics and Stochastic Analysis*, *Mathematical and Computer Modelling*, *Journal of Computational and Applied Mathematics*, *Computational and Applied Mathematics*, *Difference equations and Applications*.
- Chaired the sessions at the 23rd International Conference on Difference Equations and Applications, 2017, July, Romania.

### **C. Kelly**

- Served as a reviewer of standards for undergraduate degrees in the natural and mathematical sciences for the University Council of Jamaica in June 2017
- Became an external examiner for the School of Mathematics and Statistics, UTech from March 2017

### **D. Malinin**

- Reviewed the articles for the journals, *Journal of Mathematical Sciences*, *Journal of Algebra*, *J. "Algebra i Analiz"*.

### **N. Ponakala**

- Reviewed the articles for the journals, *Indian Journal of pure and Applied Mechanics*, *Acta Mechanica*; *Journal of Applied Fluid Mechanics and Ain Shams Engineering Journal*, Elsevier Publ.
- Chaired a technical session, The Caribbean Academy of Sciences 20th general meeting and Biennial Conference 24–26 November, 2016, Guadeloupe; International conference on Fluid Dynamics and its applications, B.N.M. Institute of Technology (BNMIT), Bangalore, July 12–14, 2017
- A Committee member for judging the conference presentations for

the selection of best Presentation at The Caribbean Academy of Sciences 20th general meeting and Biennial conference 24–26 November, 2016 Guadeloupe.

- Served as Independent external examiner for courses for School of Mathematics and Statistics, University of Technology, Jamaica.
- Served as a Member, Board of External Examiners, The University of the West Indies, St. Augustine Campus, Trinidad and Tobago

## STUDENTS

The department has graduated an average of 73.8 B.Sc. students per year with a major or minor in Mathematics; Majors in Actuarial Sciences, Mathematics with Education Studies, Mathematics and Economics and Mathematics & Modelling Processes.

For the past 5 years, a total of 396 students graduated from the department. This is broken down as follows:

2012	2013	2014	2015	2016
62	105	74	69	86

In November 2016, a total of 13 students graduated with First Class Honours degree.

### Information on Students

A breakdown by programme is provided in the following table:

Year	Math	Actuarial Sci.	Math/Ed	Math/Econ	Math/Modelling	Total
2012/13	18	26	6	10	2	62
2013/14	19	38	18	26	4	105
2014/15	8	57	2	3	4	74
2015/16	7	56	1	2	3	69
2016/17	15	63	3	1	4	86

Source: UWI Banner downloaded May 2017

## **SUMMER SCHOOL**

The department offered 25 courses for summer 2017. Some of these course were offered as exams only to facilitate students who wanted to graduate.

## **GRADUATE PROGRAMMES**

### **MSc ERM**

The Department of Mathematics, jointly with the Mona School of Business commenced the MSc Enterprise Risk Management (MSc ERM) in September 2012. A total of 9 students (cohort 4) is expected to graduate in November 2017. At the beginning of the academic year a total of 14 students (cohort 5) were registered.

### **MSc Mathematics**

In November 2016, a total of 9 students graduated from the MSc Mathematics programme. There was a decrease were seen in the number of students accepted to the MSc Mathematics programme with only 5 students were registered in that batch.

### **MPhil and PhD**

For the academic year 2016/17, 10 students registered for the MPhil and PhD programmes broken down as follows:

PhD 2

MPhil 8

During the 2016/17 academic year Mr. Andre Small graduated with an MPhil degree with High Commendation. Mr. Dominic Mills-Howell was named as one of 100 outstanding Young Global Changers from an application pool of 1300 candidates from 140 different countries. This scholarship enabled him to attend the Think 20 Summit – GLOBAL SOLUTIONS from 29–30 May 2017, in Berlin, Germany. One Ph.D and three M.Phil students submitted their thesis for examination process.