DEPARTMENT OF MATHEMATICS

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

WORK OF DEPARTMENT

For the academic year 2015/2016, the teaching staff of the Department of Mathematics was composed of one Professor, five Senior Lecturers, four Lecturers, three Assistant Lecturers and two tutors. Of these, six members of staff hold a PhD (one, in addition to PhD, has a Higher Doctorate degree), one is a Fellow of the Canadian Institute of Actuaries (UK), and one is a Fellow of the Society of Actuaries (FSA). Mr. Howard Hines FSA fully assumed the duties of the post of Director of the Actuarial Science Programme in August 2015. Two members of staff – Dr. Peter Palmer and Miss Kimberly Boswell – departed on July 31, 2016.

The Mathematics Department received approval for a new BSc Mathematics of Finance programme which is to be offered from the 2016/17 academic year. The development of this programme was supported by the

department's Industry Advisory Board, which met in January and April 2016, and which also supports the internship programme and the career fair. The Department continues to collaborate with various departments in the Faculty, offering mathematics courses to suit their needs: MATH1185 for Chemistry & Physics students, COMP1110 for Computing students, and MATH1180 and MATH2330, for engineering students.

The department's internship programme expanded to include a Christmas internship, which placed 6 students at the Jamaica Mortgage Bank over the period January 6–15, 2016. The summer internship had 41 applicants, of whom 21 were placed over the summer at the Financial Services Commission, Scotiabank, Jamaica Stock Exchange, the Insurance Company of the West Indies, Guardian Life Ltd, and the Port Authority. The department has now also established a partnership with a major insurer, Blue Cross Blue Shield of Massachusetts USA (BCBSMA), to employ select graduates starting in 2016.

The Department held its 3rd Annual Mathematics Career Fair held on Friday November 20, 2015 in the department. 71 students registered, of whom 51 participated. The companies participating were the Bank of Jamaica, Guardian Life, the Port Authority, and Victoria Mutual Building Society. The event gave students a chance to receive feedback on their CVs, self-presentation and interview skills and provided companies with a change to vet students for recruitment in advance of their graduation.

Professor Biswa Nath Datta from Northern Illinois University visited the department over May 17–19 and gave a short course entitled "Numerical Linear Algebra with Applications to Science and Engineering" in the Department. It was well attended by students of both the Mathematics and Physics Departments.

For the second time in two years, a team of undergraduate students from the department – this year Miss Sheniele Grant, Miss Tamrah Brown and Mr. Serue Edwards – represented the UWI at the McNair Scholars Research Conference at FIU, in Florida, October 14–16, 2015, where they made a presentation entitled, "Simulation issues for stochastic asset price models". Financial support was provided by the Office of the

Principal, Mona Campus, and the Dean's Office, Faculty of Science and Technology.

MPhil student, Mr Dominic Mills-Howell, was selected to be among 280 (Bachelor's and Master's) students from 80 countries participating in the CERN summer student programme as an Associate Member of Personnel at the laboratory on the Franco-Swiss border near Geneva over the period June 27–August 19. His work at CERN entailed developing a prototype related to the control and debugging of future CMS upgrade projects, which will be used for the new high luminosity collision upgrades of the Large Hadron Collider.

Dr. Nagarani Ponakala was honoured as Distinguished Young Women Scientist from Jamaica/Caribbean by the Inter-American Network of Academics of Science (IANAS) for the year 2015. The department was also pleased to note that former Head of the Department, Professor Leslie Robinson, was honoured by the campus through the naming of a student Hall of Residence in April 2016.

In outreach, the department extended its CAPE workshops to offer one through the Western Jamaica Campus in January 2016. This was well supported by high schools in the Western part of the island. Two further workshops was also offered to corporate area high schools in April 2016, with good response.

CONFERENCE PARTICIPATION WITH PAPER/TALK PRESENTED

- **Mr. Kirk Morgan** presented a talk entitled "Non-existence of bound states for the Dirac equation in the Kerr-de Sitter Metric" at a seminar entitled ""Stochastic stabilization of limit cycle dynamics arising in ecology and neuroscience" held at the Universidad de Los Andes, Bogota, Columbia, November 17–21, 2015.

- **Dr. Conall Kelly** organized the AIM SQuaRE: "Stochastic stabilization of limit cycle dynamics arising in ecology and neuroscience". American Institute of Mathematics, San Jose, California, USA, May 23–27, 2016.

- **Dr. Conall Kelly** presented a talk entitled "Stabilization of Difference Equations with noisy prediction-based control" at the 22nd International Conference on Difference Equations and Applications, Osaka, Japan, July 24–29, 2016.

- **Dr. Dmitry Malinin** presented a talk entitled "Integral and globally irreducible representations of finite groups" at the conference "Finite simple groups: 30 years of the atlas and beyond" held at Princeton University, US, November 1–6, 2015.

- **Dr. Dmitry Malinin** presented a talk entitled "Integral Representations and their Applications" at the conference "Representation Theory and Mathematical Physics" held at the Steklov Mathematical Institute, St. Petersburg, Russia, May 23–28, 2016.

- **Dr. Dmitry Malinin** presented a talk entitled "Representations of Finite Groups and some Applications to Geometry and Physics" at the XXXV Workshop on Geometric Methods In Physics, 26 June – 2 July 2016, Białowie a, Poland.

- **Dr. Dmitry Malinin** presented a talk entitled "On the Globally Irreducible Representations of Groups" at the conference Rings and Polynomials, July–8, 2016, Graz, Austria.

- **Dr. Nagarani Ponakala** presented at talk entitled "Dispersion of a solute in unsteady Casson fluid flow in an annulus with wall absorption", at the 60th Congress of Indian Society of theoretical and Applied Mechanics (ISTAM) held at Malaviya National Institute of Technology (MNIT) Jaipur, India, December 16–19, 2015. She also chaired a technical session.

- **Dr. Nagarani Ponakala** presented an invited talk entitled "Oscillatory flow effects on dispersion in Casson Fluids" at the International Symposium on Computational Fluid Dynamics, December 18, 2015, Maniple University, Jaipur, India.

- **Mr. Stephen Barnes** presented a poster entitled "A stochastic approach to pricing financial instruments for Caribbean markets" at the 2nd International Congress on Actuarial Science and Quantitative Finance, at Cartagena, Columbia, June 15–18, 2016

- **Professor Alexandra Rodkina** presented two talks entitled "Discrete Ito formula and its Applications" and "On Population Dynamics Models with Stochastic perturbations" while a visiting researcher at the Department of Statistics, at University of South Africa (UNISA), Science campus, Florida, Johannesburg, June 1–July 31, 2016. Professor Rodkina's visit was funded by UNISA.

CONFERENCE AND SEMINARS PARTICIPATION WITHOUT PAPER/TALK

- **Mr. Ajani Ausaru** attended the conference "Centenary Celebration of General Relativity Theory: Andean School on Gravity and Cosmology" Universidad de los Andes, Bogota, Columbia, November 17–21, 2015.
- M**r. Richard Plummer** attended the workshop "Applied Finance with R", University of Illinos at Chicago, USA, May 20–21, 2016.
- **Mr. Richard Plummer** attended the 2nd International Congress on Actuarial Science and Quantitative Finance, at Cartagena, Columbia, June 15–18, 2016.

INVITED VISITS AND SEMINARS

- **Dr. Nagarani Ponakala** attended an International symposium on computational fluid dynamics titled "Oscillatory flow effects on dispersion in Casson fluids" at Manipal University, Jaipur, India on December 18, 2015.

PUBLICATIONS

- E. Braverman and **A. Rodkina**, On convergence of solutions to difference equations with additive perturbations, *Journal of Difference Equations and Application* (2016), DOI: 10.1080/10236198.2016. 1161762
- E. Braverman and **A. Rodkina**, Stochastic difference equations with the Allee effect, *Discrete and Continuous Dynamical Systems* 36:11 (2016), pp. 5929–5949.

- E. Braverman, **C. Kelly** and **A. Rodkina**, Stabilisation of Difference of Equations with noisy prediction based control, Physica D: Nonlinear Phenomena 326 (2016), pp. 21–31.

- **C. Kelly**, Stochastic stability analysis of a reduced galactic dynamo model with perturbed alpha effect, *Physica A: Statistical Mechanics and its Applications* 457 (2016), pp. 480–491.

- **D. Malinin,** On integral absolutely irreducible representations of finite groups, *Journal of Algebra and Its Applications,* 15: 3 (2016).

- **D. Malinin,** One construction of integral representations of p-groups and some applications, Chebyshevskii. *Sbornik,* 16:3 (2015), pp. 322–338.

- J. Jaraden, **D. Malinin**, On Some Finite Arithmetic Groups and Generalized Permutation Modules, *Appl. Math. Inf. Sci.* 9:4 (2015), pp. 1763–1770.

- **N. Ponakala** and B. Thomas-Sebastian, Dispersion of a solute in unsteady Casson Fluid flow in an annulus with wall absorption, Proceedings of the 60th Congress of ISTAM (Indian Society of Theoretical and Applied Mechanics), MNIT, *Jaipur,* Rajasthan, India, December 16–19, 2015.

INCOME GENERATION

The Department, through Dr. Dmitry Malinin, received partial funding of €12,000 from the Centre International de Mathématiques Pures et Appliqués (CIMPA) to host a Research School entitled "Representation Theory and Applications to Differential Equations". The school will be held in January 8–20, 2017, at the UWI Mona campus in collaboration with the Mona School of Engineering, who are providing additional financial support.

The department received its share of income generated by the MSc Enterprise Risk Management over the first two years of operation, amounting to J$2,850286.

Summer school generated income of J$900,653.50.

PUBLIC SERVICE

Dr. Conall Kelly

– External assessor for academic staff promotion for the University of Guyana in December 2015

– Member, University Council of Jamaica reaccreditation team for assessment of mathematics programmes at the Northern Caribbean University, Mandeville, in February 2016

Dr. Nagarani Ponakala

– Member, Board of External Examiners, School of Mathematics and Statistics, University of Technology, Jamaica

– Member, Board of External Examiners, The University of the West Indies, St. Augustine Campus, Trinidad & Tobago

– Independent external examiner for PhD. thesis of Mr. Dayle Jogie, University of the West Indies, St. Augustine Campus, March 2016

Members of the department also regularly act as editors and peer reviewers for international journals.

STUDENTS

Over the past 5 years, the department has graduated an average of 75.8 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 379 students graduated from the department. This is broken down as follows:

2011	2012	2013	2014	2015
68	62	105	74	69

This year a total of 13 students graduated with First Class Honours degree.

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

Year	Math	Actuarial Sci.	Math/ Ed	Math/ Econ	Math/ Modelling	Total
2011/12	18	33	2	15	-	68
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

For the year 2015/16 the number of registered undergraduate in the department is as follows:

Preliminary Level   –   329

Level 1   –   536

Level II   –   229

Level III   –   109

MATHEMATICS BRIDGING PROGRAMME

The Mathematics Bridging Programme, which ran over 9 weeks in Semester 1 of the academic year and which provides support to students entering the faculty with weak basic mathematics skills, had 27 registered students. One of those received the Bridging Programme Scholarship which waives the fee charged to participants. Diagnostic testing shows improvement in basic mathematics skills for participants over the course of the programme. Going forward, the department seeks to increase participation by highlighting the programme during outreach and orientation events.

Mathematics Olympiad

Drs. Raymond McEachin and Sam McDaniel with the assistance of Dr. Peter Palmer and Mr. Ajani Ausaru served as host to the 2016 Central American and Caribbean Mathematical Olympiad (CENTRO) held in Jamaica June 15–23 at the UWI, Mona Campus.

Jamaica made history by being the first English-speaking country to host the CENTRO in its 18 years of competition. A team of 3 students, aged 16 and under, represented countries such as Columbia, Costa Rica, Cuba, the Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Puerto Rico, and Venezuela.

We are pleased to report that a Jamaican student, Jason Salmon of Campion College, won a gold medal. This is the highest achievement a Jamaican student has ever earned in an international mathematical competition. Another student, Adjaynae Billings of Ardenne High School, won an Honourable Mention. Jamaica's third student, Phillip Lloyd of Glenmuir High School, narrowly missed winning a bronze medal. The team finished in 8th place among the 13 countries competing.

GRADUATE PROGRAMMES

MSc. Enterprise Risk Management

The fourth cohort of ten students commenced in September 2015. In November 2015 we saw our second set of graduates from this programme with 3 students receiving their degrees with Distinction of the 4 persons eligible to graduate. This year, the students of the third cohort are expected to complete the requirements for the award of their degree.

MSc. Mathematics Programme

A new cohort of 3 students entered the Msc. programme in September 2015. One of these qualified for the Mathematics Bursary, awarded at the start of Semester 2.

This year, seven MSc. students satisfied the requirements for the award of their degree and are expected to graduate in November 2016. Three will be awarded with distinction.

Research Students

During the 2015/16 academic year there were 5 MPhil student and 3 PhD students registered in the department. Of those, Mrs. Binil Thomas-Sebastian, was awarded a PhD in Mathematics in October 2015, and Mr. Andre Small was awarded an MPhil Mathematics in February 2016 with high commendation.