FACULTY OF PURE AND APPLIED SCIENCES

MONA

Year ending July 31, 2009

Ishenkumba Kahwa, BSc, MSc *Dar,* **PhD** *Louisiana State*
– Dean

Dean's Overview

Preparation of the distinctive UWI graduate – initiatives, notable achievements

The Faculty continued to expand access to and the range of its programme offerings 2008-9. For example:

The Faculty increased enrollment in its various Level 1 courses by about 31%.

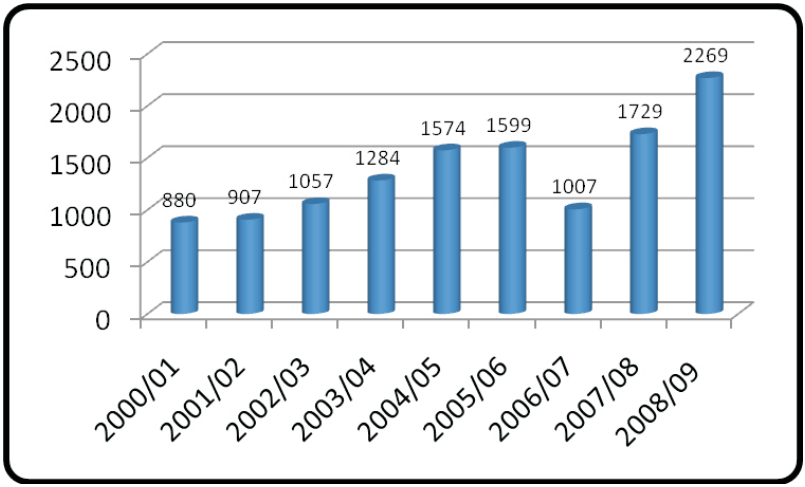

Figure 1: Growing demand for courses in the Faculty of Pure and Applied Sciences

Innovations in dealing with increased enrollment

This large increase was a result of an intense outreach campaign implemented in the previous years; it was a pleasant surprise given the large dip in enrollment in 2006/7. However, the increase caused

considerable pressure on the teaching space, laboratory equipment and staff. Through innovative approaches, flexibility of staff and more efficient use of resources, especially in scheduling laboratories and human resource deployment, and with additional temporary/part time staff, the challenges were successfully addressed. Most notably, additional laboratory streams in physics, life sciences, computing and mathematics as well as a Saturday chemistry laboratory stream (accommodating nearly 100 additional students) were introduced. All departments registered increases as shown in Figure 2.

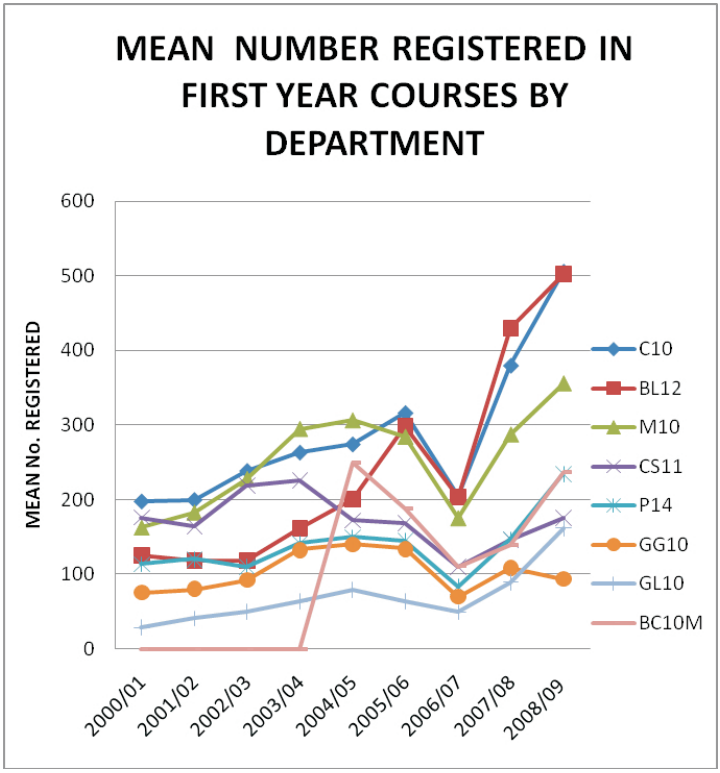

Figure 2: Distribution of enrolled students by Department.

Initiatives for enhancing the learning experience include:

New Programmes

Agriculture: Development of new agriculture programmes of study at both the graduate and undergraduate levels were developed. A

programme in Tropical Horticulture was finalized and approved for delivery beginning in the 2009/10 academic year. Advanced preparative work was made on other areas such as agro–processing.

Engineering: A new Electronics Engineering programme – the first UWI Engineering programme to be offered outside of the St. Augustine campus was completed for delivery in 2009/10. The Electronics Unit and the Faculty of Engineering at St. Augustine will partner with the Department of Physics to roll out the first year of the programme in September 2009.

Biotechnology: Teaching of tissue culture techniques was enhanced by in-house designed and fabrication of build a low cost mobile micro-propagation unit which facilitates high throughput of students in tissue culture laboratory techniques. The innovation supplements the laminar flow tissue culture equipment thereby enabling more hands-on experience for more students.

Chemistry: ***Peer-Led Learning Project:*** Driven by the dedication to provide an environment that creates and maintains enthusiasm for Chemistry and high quality instruction, the Peer-Led Team Learning project was introduced. This is designed to improve the learning experiences and performance of introductory level students through small group workshops with Peer Leaders. The pilot project produced satisfactory results and received positive feedback from the Peer Leaders as well as the students who participated. Further, postgraduate students through a recently re-launched Chemical Society (which is formed by undergraduate and postgraduate students, research fellows and academic staff) began organizing and running useful tutorial before the April/May examinations

International Student exchange: **Miss Janelle Morris**, a student from the industrial chemistry undergraduate course (CHEM3402), was selected for an internship, in summer of 2009, at Hambolt-Universitat zu Berlin (in the Chemical Analysis laboratory of the Department of Crop and Animal Sciences). This new initiative was effected through the International Association for the Exchange of Students for Technical Experience (IAESTE). Ms. Morris' travel expenses were covered by a grant from the Office of the Principal. In turn the department hosted Miss Anne Brieger, a final year student from the Faculty of Agriculture of the University of Bonn, Germany. Miss Brieger worked on a project for the Sugar Industry Research Institute (SIRI), which paid her salary.

Computing: The Department has implemented (2008/9) the curriculum reforms designed to introduce object-oriented programming, such as Java, into Level 1 courses and data structures were taught at level 1 within the context of object-oriented programming instead of functional programming. Functional programming and object-oriented programming are taught in both semesters thereby exposing students to a broader range of programming paradigms than hitherto and allowing for rapid recovery, in case of failure, and flexibility. This is expected to enable students to access a more diverse set of advanced course at levels 2 and 3. For example, students now have a stronger programming background to engage new and popular advanced courses such as Web Development.

Life Sciences: A programme designed to expose students to Jamaica's marine resources and the need to develop and protect them, i.e. the Marine Biology major was run for the first time and the course Caribbean Biodiversity, BL39D/BIOL3019, was reinstated at level III.

Mathematics: The Department implemented a 'Mathematics Bridging programme' in August 2008 to assist students coming to the University with deficiencies in mathematical skills and competences to successfully access mathematics-rich courses in disciplines such as mathematics, computing, physics and chemistry. The programme will be rolled out on larger scale in 2009/10 following informative trials in 2008/9.

Physics: (i) New Majors: The Department has concluded curriculum development and reforms that will see new courses and programmes ready for offering in 2009/10. The electronics programme has been revamped, the major in Materials Science was ready for reintroduction and a new major in Medical Physics and new look first year programme were also ready to be offered in 2009/10.

A Virtual Lab: To enhance teaching and learning (including research) at the undergraduate level, a 50-seater Physics Virtual Laboratory was designed and funding sought to successfully establish it in 2008/9. The Laboratory houses state of the art software, hardware and teaching technology, which has already begun to transform how some areas of physics are taught. The Laboratory was funded through Departmental sources along with grants from the University and the Government of Jamaica.

The electronics unit organized internship placement for students.

Improvements in Graduate Studies; notable accomplishments of graduates

Overall there was an increase in the number of students who completed their MSc, MPhil and PhD programmes respectively and graduated in November 2008. Additional notable achievements include:

Biotechnology: There is a high demand for graduate education in biotechnology as indicated by the number of applications, but there are no sufficient staffing, laboratory space and equipment infrastructural resources to accommodate them.

Chemistry: Professional growth among graduate students and structured engagement with the faculty was fostered by the formation of the Chemistry Association of Postgraduate Students (CAPS) in September 2007. The CAPS played a major role in the planning, organizing and implementation of several activities for the department and faculty. These include the CAPE workshop, Research Day, the National Science Expo held at UTECH, assistance with Faculty pre-orientation and orientation exercises and re-launched of the over 50 year old Chemical Society (CS) on the February 12, 2009. The CS allows structured interaction and professional growth among both graduate and undergraduate students and academic staff. The chemistry tutorials organized and conducted by graduate students for undergraduate colleagues before the April/May 2009 examinations were successful; they provided growth opportunities for both graduate and undergraduate students while enriching the teaching programme.

Geography and Geology: The Department has a vibrant and productive group of graduate students under its supervision. Opportunities for teaching, learning and research have been enhanced by the appointment of a new museum curator at a PhD level who has already begun an innovative programme of educational activities. A collection of new 135 agate items was donated to the museum by Anthony Porter and more than 500 new specimens have been accessed and labeled in a major overhaul of the museum's collection data base and cataloguing system.

Life Sciences: A new programme, MSc MATE (Marine and Terrestrial Ecosystems: Assessment, Conservation and

Management), formed out of two old programmes, was prepared and will be ready for delivery in 2009/10.

Mathematics: Preparation for revision, enrichment and resumption of the MSc in Mathematics Programme was finalized. A preliminary programme was developed to attract to and prepare more students (in particular from University of Technology) for the MSc programme. The two aspects of the programme are expected to start in 2009/10 with about 30 students.

Mona Institute of Applied Sciences (MIAS): MIAS continued to offer industry needed graduate education: e.g. programmes and enrollment were: MSc (Computer Science) -50; Post Graduate Diploma in Information Technology-15.

Physics: No new programmes were introduced but the MSc in Digital Technology continued with a new batch of 8 students; 5 completed the requirements for graduation.

Multidisciplinary Programmes: Collaborations with the office of the Principal, Faculty of Social Sciences and Mona School of Business produced an advanced draft of an MSc curriculum for a programme in Agricultural Entrepreneurship. This programme will be finalized for approval in early 2009/10 academic year.

Improving research/ innovation output, notable achievements, distinctive research output

The faculty continued its advancement in research.

Research/Innovation Output

Department/Centre/ Institute/Unit	Number of Items				Edited Works
	Referred Articles/ Chapters	Patents	Non Referred Articles	Conference Presenta-tions	
Biotechnology	11	–	1	15	5*
Chemistry	31	1(filed)	2	3	–
Computing	13	–	–	2	1
Electron Microscopy	3	–	–	–	–

Electronics Unit	–	–	–	–	–
Geography/Geology	17	–	–	21	4
Life Sciences	17	–	2	20	7*
Mathematics	13	–	–	–	4
MIAS	–	–	–	–	–
Physics	11	–	–	15	–

Notable Achievements

Biotechnology and Life Sciences: There is growing recognition of the good quality research capacity on the ground as evidenced by guest editorship of a total of 8 international literature volumes. The maturing capacity in the vital postharvest technology is also evident in the rather large number of papers in the area. Thus, UWI has the capacity it needs to move aggressively in horticulture and agro-processing.

The application of macro-propagation and micro-propagation techniques of trees being used for medicinal, fruit, forestation, timber, spice and yam stick purposes has shown potential for forest restoration and alternative livelihood for inhabitants.

Very encouraging results were obtained for the work on transgenic papaya developed to fight the most deadly virus (papaya ring spot virus) that is limiting papaya production. The transgenic papaya did not exhibit any major unintended alterations in either the nutritional or the antinutritional composition. Additional test are required to claim complete equivalence between transgenic papaya and the rest on the market.

Chemistry: The Department's investment in crystallographic capacity is bearing fruit as structure elucidation by this technique is now more common.

Interesting results from new research areas have began to emerge; for example research in raspberry which grown wildly in Jamaican highlands has revealed compounds with some anti-cancer ability.

Computing: The cardiovascular simulator went into more extensive trials involving several major US universities prominent in cardiac surgery educational programmes (i.e. Mass. General Hospital (Harvard Medical School), Johns Hopkins University, Mayo Clinic, Vanderbilt

University, Rochester University, University of North Carolina (Chapel Hill), University of Washington, and Stanford University). Further development of a second version of the simulator to expand its functionality and to improve its usability is under way.

A new research programme exploring the potential for using Wireless Sensor Networks (WSN) to create intelligence based services for shopping, tourism enhancement, trade and other services is beginning to show interesting results.

Mathematics: Studies of mathematical solutions of noisy systems or systems that have potential to be affected by noise induced from neighbours have thrown new light on how systems can be stabilized by introduction or removal of noise. This is important for biomedical, financial, mechanical and other important processes/applications for which predictability requires complex mathematical modeling in which noise could be a critical factor. Strengthening of mathematical modeling is a key development.

Physics: Development of a novel approach for systematic evaluation of the homogeneity of daily surface temperature observations for the Caribbean and neighbouring regions on a monthly timescale. This novel approach is more effective compared to the conventional use of highly correlated nearby stations, given the sparse station network for the Caribbean and adjacent areas.

Distinctive Research/Scholarly Output

The Department of Life Sciences and the Centre for Biotechnology staff has been invited to edit a total of 7 monographs on a variety of agri-science subjects. The recognition of this capability by the international scientific community brings high reputation to the University. Chemistry's discovery of insecticidal activity of oily extracts from Jamaica plants is a major step in the potential use of Jamaican plants products.

Service to the wider community, including the Open Campus community; notable achievements

Biotechnology: Tissue culture technology transfer through Farmers in Manchester and Trelawny.

Chemistry: Leading provider of public and targeted education on occupational and environmental safety and health in Jamaica and the region (activity in Trinidad and Tobago).

Computing: Engaged local and hemispheric companies in search of opportunities for student training and consultancy services provision. E.g. **Jamaica National Building Society** to provide consultative services and software to automate certain labour intensive processes.

Provision of input on a newly proposed **Cyber Crimes Act** in Jamaica.

In September, 2008, two recent graduates were selected to participate in a 6 week internship with a leading Costa Rican IT company, named **Avantica.**

Geography & Geology: Facilitating the search for petroleum on Jamaica's terrestrial and marine locations.

Provision of research data for disaster mitigation and management.

Life Sciences: The Marine laboratory maintains the only decompression chamber (useful for rehabilitation of deep sea divers).

Leading effort to replant mangroves along Jamaica's coastline.

Mathematics: Facilitation of development of data collection processes at the Ministry of Agriculture.

Provision of actuarial financial services advice.

Staging of mathematics Olympiad; events attracted teachers and students from high schools. The goal is to enhance problem solving skill and improve learning outcomes in mathematics education across the board. The programme will also prepare students for the international mathematics Olympiad competitions.

All Departments have outreach activities such as bringing to the Faculty school children for a structured exposure to science, helping candidates preparing for CAPE examinations, visits to schools in inner city areas to promote science and mathematics and provision of external

examiner services to other tertiary education institutions (CASE, UTECH, Community Colleges).

Several Departments offer services to the Open Campus through the B Ed programme.

All Departments and Centres provide referee services to international journals while some serve as editors.

Transformation of the administrative culture and processes to better respond to all our stakeholders

The Department of Mathematics and Computer Science was split into two independent Departments: Department of Computing (named to better reflect its broad areas of the computing discipline) and the Department of Mathematics. This was to allow focus, expansion and growth of both disciplines.

Addressing the funding constraints.

Resources continues to be a major issue for the Faculty but departments, centres, units and institutes have been moderately successful at attracting funding. The notable ones (over **J$3M**) are:

Notable External Grants

Dr. Judith Mendes **-** European Union EDULINK grant **- £488,000.00** for the project: The Caribbean Reef Education and Training Initiative (CREATIve). CREATIve will transform the way Coral Reef Biology and Management is taught throughout the region and produce a landmark textbook on the subject.

Sylvia Mitchell**:** The sum of **$14,772,000.00** has been granted for the period November 2008 – November 2011 by the Forest Conservation Fund for the identification, propagation and dissemination of native forest species of Jamaica.

Drs. M. Coley & A. Greenaway - **US$121,400.00** from Alcoa World Alumina (October 2008) for research project on "*Caustic-Soluble Chromium and Zinc in Jamalco Bauxite.*"

Webber, M.K. - on-going funded projects. Forestry Conservation Authority/Jamaica Protected areas trust grant for **J$5,229,006.00** with

Mr. Camilo Trench (Scientific Officer PRML) for the establishment of a mangrove and coastal plants seedling nursery.

The impact of Marine Invasive species on Jamaica's Biological Diversity, through Ballast Water. EFJ Research grant for **J$3,449,000.00** with two other researchers and the Institute of Jamaica's Natural History Division.

Dr. Skobla and Dr. Voutchkov- **J$5.3M** from the Government of Jamaica, Cabinet Office, Public Sector Modernization Division for "Strengthening Medical Physics through Virtual Education and Training".

US$284,000 IAEA Project JAM0004 "Developing National Capacities for the Application of Nuclear Science in Jamaica".

Dr. Mitko Voutchkov participated as a team member in the IAEA RLA6061 Regional Latin American project entitled "Training and Updating Knowledge in Medical Physics (ARCAL CVII) including 22 countries. The overall budget for the project is **US$708,330;** the amount for each participant is not yet confirmed.

Byron Wilson: Various external sources **US$68,000** to support work on iguana and other conservation work.

Income Generation Activities

Departments were engaged in various income generation activities, the most notable incomes are:

- Chemistry total: J$62.6M
- Electronics Unit: J$3.6M
- Life Sciences: J$11.1
- Mona Institute of Applied Sciences: J$19.9M.

DEPARTMENT OF CHEMISTRY

Professor Paul B. Reese, BSc (Hons), *UWI,* **DPhil** *Sussex,*
CChem, FRSC – Head of Department

OVERVIEW

The Department of Chemistry continues to fulfill its mandate to provide first class teaching, research and service, with the purpose of producing competent chemists at all levels of professional development and contribute to the development of the wider community, the nation and the world at large.

For the academic year 2008-2009 fifty-six undergraduate students, including two first class honours, completed a Bachelor of Science in Chemistry while seven postgraduate students completed their Doctor of Philosophy degree, two with high commendation. There was a significant increase in the number of students enrolled at the introductory level which exceeded the limit to our laboratory facilities. This problem, however, was quickly rectified by extending laboratory sessions to Saturdays.

Driven by the dedication to provide an environment that creates and maintains enthusiasm for Chemistry and high quality instruction, the Peer-Led Team Learning project was introduced. This is designed to improve the learning experiences and performance of introductory level students through small group workshops with Peer Leaders. The pilot project produced satisfactory results and received positive feedback from the Peer Leaders as well as the students who participated.

As part of the ongoing quest to improve facilities, the C3 and C6 lecture theatres were upgraded with projectors and screens. The Chemical Society was re-launched by the Chemistry Association of Postgraduate Students (CAPS) to promote an understanding of the discipline in the wider society. The Occupational and Environmental, Safety and Health (OESH) programme and the CAPE workshops continue to realize their goals by making a significant impact on the participants.

The exceptional service given by the department was revealed through the Customer Service Evaluation in September 2008. A rating of 4.0 and 79.5% was achieved and was the highest score on the Campus.

The numerous outputs of publications to high impact journals, and presentations at major conferences are clear indications of the Department's commitment to maintain a high standard through quality research. Over **J$13 Million** of research grants was secured for several projects in the department while another **J$13 Million** was generated through income.

HIGHLIGHTS OF MAJOR ACTIVITIES

The Occupational and envirnonmental, Safety and Health (OESH) Programme

This programme continues its quest to raise the awareness of the nation and region by addressing issues of OESH. The programme undertook a number of training initiatives which include the following:

- **Feb – Mar 2009** – Asbestos Site training for Inspectors at the National Environmental and Planning Agency (NEPA). Training was delivered on-line as well as face to face.
- **June – July 2009** – Industrial Hygiene training for the Enforcement Officers Trinidad and Tobago at the Occupational Safety and Health Authority (TTOSHA) in Trinidad. Training was conducted by Dr. Gary Brown.
- **July 2009** – Chemical Safety training for the hatchery workers at the Jamaica Boilers Ltd. plant.

The programme also facilitated its first short course. This initiative, led by Ms. Elva Clarke, introduced the **Essentials in Occupational Safety and Health (EOSH)**. The course lasted for thirty (30) hours and targeted persons in the workplace.

World Day for Safety and Health at work is recognized each year on April 28, by the International Labour Organization (ILO). To commemorate the day, the OESH section hosted a panel discussion which saw participation from the Ministry of Labour, the Jamaica Employers Federation, and representatives from the Trade Unions.

In June 2009, Mr. Paul F. Brown and Ms. Grace Hosang travelled to the St. Augustine Campus to assist with the logistics for setting up the MSc OESH programme which was slated to be offered at that campus for September 2009.

The third cohort for the programme began in September 2008. Nineteen (19) students (18 MSc and 1 PhD) were enrolled. Of the 18 MSc students, eight (8) were full-time and ten (10) part-time.

Eighteen (18) MSc graduates from the OESH programme were presented at the November 2008 graduation ceremony. Two of the graduands, namely, **Ms. Kamille Gyles** and **Ms. Latoya Palmer** were awarded their degrees with distinction.

Peer-Led Team Learning (PLTL) Project

Peer-Led Team Learning (PLTL) is an innovative teaching method designed to maximise interaction between students and encourage a problem solving approach and respect for 'the chain of reasoning'. The project was implemented by Dr. Novelette Sadler-McKnight and Mr Imron Miller in the 2008/09 academic year as a part of efforts by the Chemistry Department to improve the learning experiences and performance of introductory level students. It involved the placement of students into small groups under the guidance of a Peer Leader, a student who was very successful in the course in the previous year. The students met in weekly 'workshop' sessions to tackle problems, discuss difficult concepts, and generally enjoy doing chemistry for about two hours. The broad aims of the workshop, therefore, were to allow students to construct their own knowledge of Chemistry by working through their own gaps in understanding and take responsibility for their own learning.

The PLTL project was piloted in two introductory level courses; CHEM1901 and CHEM1902. Five peer leaders were recruited and trained. A total of 48 students participated in the project in the first semester and 59 students (18 of whom were from semester 1) participated in the second semester. They self selected themselves into five groups, each group under the guidance of a Peer Leader. Each group completed six workshop sessions in Semester 1 and ten sessions in Semester 2. The relative performances of PLTL participants, non-PLTL students, and the population were assessed using their course grades.

	CHEM1901			CHEM1902		
Student Group	**% Pass**	**Avg. Score**	**% with 'AB' Grade**	**% Pass**	**Avg. Score**	**%with 'AB' Grade**
PLTL Students	64.6	49.48	29	74.6	52.47	44
Non-PLTL Students	49.3	44.29	19	59.1	45.50	22
Population	52.1	44.80	20	62.3	45.8	25

Despite having a similar background in advanced level chemistry, PLTL participants had a higher pass rate, a higher average score, and higher percentage of grades in the 'AB' bracket.

In general students had a positive view of the PLTL programme. The majority expressed the fact that the workshop sessions improved their problem solving skills, increased their confidence in their ability to do Chemistry, and made the discipline more enjoyable to them. They also had an overall positive view of their Peer Leaders and the workshop materials. The Peer Leaders felt this experience expanded their knowledge and understanding of Chemistry, while strengthening their leadership skills.

Based on the success of the pilot project, there are now plans to implement the PLTL programme on a larger scale. Hence, twelve Peer Leaders have been recruited and trained for the 2009-2010 academic year.

OUTREACH ACTIVITIES

CAPE Workshop

The annual workshop on spectroscopy and chromatography, for students sitting the Caribbean Advanced Proficiency Examinations (CAPE) in Chemistry, was held during the period March 28-29 and April 4-5, 2008. A total of 485 students and 28 teachers from several secondary institutions across the island participated.

The workshop was coordinated by Dr. Novelette Sadler-McKnight and presentations were given by Dr. Roxan Richards-Johnson (uv/visible, infrared), Mr. Kamau Francis (chromatography), Ms Grace-Anne Bent (mass spectrometry) and Prof. Robert Lancashire (the use of computers in teaching spectroscopy). Dr. Sadler-McKnight was also ably assisted

by graduate students in the department who gave demonstrations on the use of some spectroscopic equipment, conducted problem solving tutorials on spectroscopy, and demonstrated a chromatography experiment.

The Department also hosted 64 students, from one secondary institution, for their CAPE and CSEC chemistry laboratory sessions.

BEd (Distance) Project and BEd/Open Campus Programme

Summer laboratory sessions were held for six courses (CHEM1901, CHEM1902, CHEM2001, CHEM2102, CHEM2202 and CHEM2302) of the BEd (Distance) and Open Campus programmes. A total of 31 students were enrolled in these courses.

Departmental Workshops

X-ray Crystallography

In September 2008, Dr. Marvadeen Singh-Wilmot conducted a series of workshops for Graduate Students in X-ray Powder Diffraction (XRD) Methods. They were held over a period of four days and engaged three students per day (total of twelve) in the theory and practice of XRD.

Occupational Safety and Health (OSH)

Mr. Vaughn Brown, Maintenance Supervisor, held a series of OSH workshops for members of the technical and service staff in the department. Special training was given in electrical hazard control.

Chemistry Association of Postgraduate Students & the Chemical Society

The Chemistry Association of Postgraduate Students (CAPS) is a union formed, in September 2007, to represent postgraduate students in the Department of Chemistry. During the 2008-2009 academic year CAPS, under the leadership of Mr. Oscene Barrett (President), played a major role in the planning, organizing and implementation of several activities for the department and faculty. These include the CAPE workshop, Research Day, and the National Science Expo held at UTECH. They also assisted with pre-orientation and orientation exercises in the faculty. After much consideration, the members of CAPS saw the need

for greater interaction amongst the chemistry population and so they re-launched the Chemical Society on the February 12, 2009.

The Chemical Society is a prestigious club which was formed over fifty years ago, but had been inactive for the past four years. Its mission is '*To cultivate a love for Chemistry among its members by creating pathways for a deeper understanding of the subject, and showing its practical application in all aspects of modern life, as well as to promote the image and understanding of Chemistry in the wider community and society.*'

The society has approximately 100 members consisting of undergraduates, postgraduates and faculty. At present the executive body, led by Ms. Alicia Bucknor (President) and Mr. Mark Lawrence (Vice-President), is made up of graduate students from various fields of chemistry within the department. During the semester the committee organized and executed a series of educational and fun activities for its members. They also hosted special tutorial sessions, prior to the April/May 2009 examination period, for several of the core undergraduate chemistry courses. The programme received overwhelming support from both members and non-members, and the students found the sessions to be quite beneficial.

Student Enrolment

The number of students enrolled at the preliminary level has been consistent over the past three years. However, there was a 25.5% increase in enrolment at the introductory level over the previous year which more than doubled the number in 2006/2007. At the advanced level, there was an 11.5% decrease from the average number of students over the previous two years. Five new graduate students were enrolled, while eight graduate students took leave of absence.

Level	**2006/2007**	**2007/2008**	**2008/2009**
Preliminary	406	378	385
Introductory	413	732	919
Advanced	1124	1108	988
Postgraduates	60 (32 F/T; 28 P/T)	64 (32 F/T; 32 P/T)	59 (31 F/T; 28 P/T)

Principal's Research Day Award

Professor Yvette Jackson and **Dr. Nadale Downer-Riley** (Research Fellow) were awarded the Principal's Research Day Award for Best Publication for their paper – "The iodine-mediated cyclisation of thiobenzamides to produce benzothiazoles and benzoxazoles," Tetrahedron, 2007, 63, 10276-10281.

Professor Robert Lancashire also received the Principal's Research Day Award for Best Publication for his paper entitled "Chemical Markup, XML, and the World Wide Web. 7.CMLSpect, an XML Vocabulary for Spectral Data," Journal of Chemical Information and Modelling, 2007, 47, 2015-2034.

Gleaner Honour Award

Professor Robert Lancashire was the recipient of the 2008 Gleaner Honour Award for Science & Technology.

Course Assessment Awardees

Ms. Fiona HoShing, Dr. Sandra Jarrett, Mr. Alwyn Lynch (Part-Time Food Chemistry), Dr. Roxan Richards-Johnson and Dr. Marvadeen Singh-Wilmot received recognition for their achievement on the Course Assessment of Lecturers over the previous academic year.

Premium Teaching Awards 2008

Dr. Marvadeen Singh-Wilmot received recognition for her contribution to teaching at the UWI Guardian Life Teaching Awards Ceremony, October, 2008.

UWI Long Service Awardees

Professor Helen Jacobs, Professor Ishenkumba Kahwa and **Mr. Lloyd Samuels** were honoured at the UWI Annual Long Service Award. They have each completed twenty-one years of service.

Deparmental Awards and Prizes

Six undergraduate students received awards, ranging from $10,000 to $60,000, for their academic performance in Chemistry. They are, **Tomeika Myers** (Cedric Hassall), **Shonna-lee Finegan** (Garfield

Sadler), **Alexa Redway** (Wilfred Chan), **Kevern James** (L. J. Haynes), **Je-Ann Murray** (Chemistry Department), and **Orain Brown** (Pavelich/Honkan).

Special Recognition

Dr. Donna Minott-Kates and **Dr. Anthony Greenaway** received special recognition for their work with the Bureau of Standards Jamaica technical committees at a ceremony held in December 2008.

Research Fellowships

Two members of staff had their UWI Research Fellowships extended for the period August 2008–July 2009. They are **Professor Yvette Jackson** – *"Benzothiazoles and Analogues of Shermilamine B: Mechanistic Studies and Synthesis"* and **Dr. Paul Maragh** – *"Syntheses Characterization and Reactivity Studies on Novel Oxo-centered Trinuclear Transition Metal Complexes to be Used as Biological Models."*

Professorial Inaugural Lectures

Three professors presented their Inaugural Lectures during the year.

Prof. Robert Lancashire, Professor of Computational Chemistry, lectured on *"Visualization of Chemistry and Developing the Power of the Internet"*

Prof. Mohamed Bakir, Professor of Inorganic Chemistry, lectured on *"The Development of Smart Molecular Systems for Sensing, Catalytic and Therapeutic Applications."*

Prof. Willem Mulder, Professor of Physical Chemistry, addressed the topic *"Not without Art, but yet to Nature True – Mathematical Modelling of the Structure- Property Relationship of Condensed Matter."*

POSTGRADUATES

Seven postgraduate students successfully defended their theses and were awarded the PhD degree. They are **Grace-Ann Bent** (with high commendation), **Duanne Biggs, Julie-Ann Grant, Kayanne McCook, Patrice Peart, Floyd Russell** and **Richard Taylor** (with high commendation). The supervisors were Prof. T. Dasgupta, Dr. P. Maragh

(co-supervisor), Dr. R. Porter, Prof. Y. Jackson, Prof. P. Reese (3 students) and Dr. H. Ellis, respectively. Five students also submitted their MPhil theses while another two students transferred to the Ph.D. programme.

Two students of **Dr. N. Sadler-McKnight** obtained grants from the Mona Campus Committee for Research & Publications and Graduate Awards to attend workshops overseas. They are **Ms. Norda Stephenson** who participated in a workshop on Science Writing Heuristics at University of Wisconsin, July 30-August 1, 2009 and **Mr. Imron Miller** who attended a training workshop on Peer led Team Learning at City University of New York, July 6-10, 2009.

Work Exchange Programme

Miss Janelle Morris, a student from the industrial chemistry undergraduate course (CHEM3402), was selected for an internship, in summer of 2009, at Hambolt-Universitat zu Berlin (in the Chemical Analysis laboratory of the Department of Crop and Animal Sciences). This new initiative was effected through the International Association for the Exchange of Students for Technical Experience (IAESTE). Ms. Morris' travel expenses were covered by a grant from the Office of the Principal. In turn the department hosted Miss Anne Brieger, a final year student from the Faculty of Agriculture of the University of Bonn, Germany. Miss Brieger worked on a project for the Sugar Industry Research Institute (SIRI), which paid her salary.

PAPERS PRESENTED

- **C. S. Bowen-Forbes,** V. Mulabagal, Y. Liu and M. G. Nair, "Jamaican *Rubus* Fruits Inhibit Lipid Peroxidation and Cyclooxygenase Enzymes Activities". American Chemical Society, 42nd Western Regional Conference, Las Vegas, NV, USA. (September 2008).
- Y. Liu, V. Mulabagal, **C. S. Bowen-Forbes** and M. G. Nair, "Bioactive Compounds Present in the Indian Herbal Drink Prepared by Boiling the Commercial Product *Panamrutham*". American Chemical Society, 42nd Western Regional Conference, Las Vegas, NV, USA. (September 2008).

- M. Thompson, **W. Gallimore,** M. Townsend, N. Chambers and L. Williams, "An Investigation of Potential Uses for Amphitoxin, A Pyridinium Alkaloid from the Jamaican Sponge, *Amphimedon compressa.*" Fapronatura Second International Symposium on Pharmacology of Natural Products, Varadero, Cuba, June 3-7, 2009.

- A. L. C. Morris, S. A. Hepburn, N. O. Townsend and **Y. A. Jackson,** "Approaches toward the Synthesis of Nitrogenous Analogues of Rotenoids," Oral presentation at the 237th American Chemical Society National Conference, Salt Lake City, Utah, USA, March, 2009.

- **R. Lancashire,** "Chemistry in an Immersive Learning Environment," IUPAC General Assembly, Glasgow, Scotland, May, 2009.

- **I. Thompson,** "Strategies used to develop entrepreneurial skills in Chemistry undergraduate students in Jamaica", 7 pages, Institute of Food Technologists, AMFE, Anaheim/OC, CA, USA, June 6-9, 2009.

The 236th National Meeting of the American Chemical Society, Philadelphia, PA, U.S.A. (August 17-21, 2008).

- M. A. W. Lawrence, **P. T. Maragh** and **T. P. Dasgupta,** "Kinetics & Mechanism of the Oxidation of L-Ascorbic Acid by Oxo-centred Trinuclear Cations, $_3$-oxo-Triaqua- hexakis carboxylato)bis-(chromium(III)-(iron(III))$^+$, $[Cr^{III}_2Fe^{III}O(RCO_2)_6(H_2O)_3]^+$, (where R = CH_3, CH_3CH_2 and $(CH_3)_2CH$) in Aqueous Acetate Buffer."

- K. Green, **T. P. Dasgupta, P. T. Maragh**, K. Abdur-Rashid and W. Jia, "Planar Chiral N-Heterocyclic Carbene Ligands Derived from [2.2]Paracyclophane and their Transition Metal Catalysts."

- S. Haley, **T. Dasgupta, P. Maragh** and C. Ingram, "Polychlorobiphenyls in the Jamaican Environment and Their Dechlorination Using Doped HY-Zeolite."

- N. James, **P. Maragh** and **T. Dasgupta,** "Assessing the levels of Methyl tertiary-Butyl Ether (MTBE), tertiary-Butyl Alcohol

(TBA) and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX), and fate of MTBE in Jamaican water."

- N. Stephenson, **N. Sadler-McKnight,** and M. Rainford, "Measuring the effects of socio-cultural factors in Jamaican 12th grade chemistry classrooms," 236th Annual Meeting & Exhibition of the American Chemical Society, PA, USA, August 17-21, 2008.

PUBLICATIONS

Referred Journals

* **M. Bakir,** R. R. Conry, O. Green and W. H. Mulder, "Synthesis, spectroscopy, thermodynamics and structure of [$ZnCl_2$ (^{3}-dpktch)] (^{3}-dpktch = N, N, O- di-2-pyridyl ketone thiophene-2-carboxylic acid hydrazone)," *J. Coordination Chemistry,* 2008, 61, 3066-3079.

* **M. Bakir,** R. R. Conry and O. Green, "X-ray crystallographic and molecular sensing properties of [$ZnCl_2$ (^{2}-N, N'-dpknph)] (dpknph = di-2-pyridylketone-p-nitrophenyl hydrazone)" *J. Mol. Struct.*, 2008, 889, 35-44.

* **M. Bakir** and O. Green, "Molecular sensing behavior of di-2-pyridyl ketone p-aminophenylhydrazone hydrate (dpkabh.H_2O) in non-aqueous media" *Spectrochimica Acta* 2009, 72, 50-55.

* **M. Bakir** and C. Gyles, "Synthesis, Characterization and Structure of the First Rhenium Compound of Di-2-pyridyl ketone thiophene-2-carboxylic acid hydrazone (dpktah), *fac*-[$Re(CO)_3$(N,N- ^{2}-dpktah)Cl]", *J. Mol. Struct.,* 2009, 918, 138-145.

* **M. Bakir,** R. R. Conry and O. Green, "X-ray crystallographic, spectroscopic and electrochemical properties of [$HgCl_2$ (^{2}-N,N'-dpktch)] (^{2}-N,N'-dpktch = di-2-pyridyl ketone thiophene-2-carboxylic acid hydrazone)" *J. Mol. Struct.,* 2009, 921, 51-57.

* **C. S. Bowen-Forbes,** V. Mulabagal, Y. Liu and M. G. Nair, "Ursolic acid analogues: non-phenolic functional food

components in Jamaican raspberry fruits," *Food Chemistry,* 2009, 116, 633-637.

* E. Petrunak, A. C. Kester, Y. Liu, **C. S. Bowen-Forbes,** M. G. Nair and G. E. Henry, "New benzophenone O-glucoside from *Hypericum ellipticum," Nat. Prod. Comm.,* 2009, 4, 507-510.

* S. Campbell, R. Alexander-Lindo, D. McGrowder, L. Gordon and **T. Dasgupta,** "The Effect of S-Nitroso-N-Acetylpenicillamine and S-Nitroso-Captopril co-administered with cysteine on blood glucose concentration in animal model," *Amer. J. Biochem. Biotech.*, 2008, 4, 265-272.

* S. Campbell, R. Alexander-Lindo, D. McGrowder, L. Gordon and **T. Dasgupta,** "The Effect of S-Nitrosocaptopril and S-Nitroso-N-Acetyl-D,L-penicillamine on glucose concentration and haemodynamic parameters," *J. Applied Biomedicine,* 2009, 7, 123-131.

* R. F. Brown, **T. P. Dasgupta, P. T. Maragh** and A. A. Holder, "Dynamic Studies of Transnitrosation of Thiols of Biological Importance by the Nitrosated 4, 4', 4" ,4"' -Tetrasulfophthalocyaninecobaltate(III) Anion in Aqueous Solution," *Biophysical Chemistry*, 2009, 141, 198-202.

* R. A. Taylor and **H. A. Ellis,** "Anhydrous polymeric zinc(II) pentonate," *Acta Cryst.,* 2008, E64, m895.

* N. A. S. White and **H. A. Ellis,** "Room temperature structures and odd-even behaviour of a homologous series of anhydrous *n*-alkanoates," *J. Mol. Struct.,* 2008, 888, 386-393.

* N. A White and **H. A. Ellis,** "Thermal Behaviour of even Chain Length Lithium *n*-Alkanoate," *Mol. Cryst. Liq. Cryst.,* 2009, 501, 28-42.

* R. A. Taylor and **H. A. Ellis,** "Polymorphism, crystal-crystal and liquid crystalline phase transition behaviour of even chain length zinc(II) n-alkanoates," *Liquid Crystals,* 2009, 36, 257-268.

* R. A. Taylor, **H. A. Ellis** and **P. T. Maragh,** "Solid State ^{13}C-NMR and Infrared Studies on the Molecular Packing of Anhydrous Zinc(II) n-Alkanoates," *J. Mol. Struct.,* 2009, 921, 118-125.

* **W. A. Gallimore,** C. Cabral, M. Kelly and P. J. Scheuer, "A novel D-ring unsaturated A-nor sterol from the Indonesian sponge, *Axinella carteri dendy,*" Nat. Prod. Res., 2008, 22, 1339 -1343.

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* N. K. Downer-Riley and **Y. A. Jackson,** Highlight Syntheses, *Annu. Rep. Prog. Chem., Sect. B*, 2009, 105, 167-189.

* O. E. Christian, **H. Jacobs**, S. McLean and W. F. Reynolds, "Prenylated benzophenones from *Hypericum hypericoides,*" *Nat. Prod. Comm.,* 2008, 3, 1781-1786.

* **S. Jarrett,** A. Brown and **M. Singh-Wilmot,** *Heterocycles,* 2009, 78. DOI: 10.3987/COM-09-11768.

* J-C. Bradley, **R. J. Lancashire,** A. S. I. D. Lang and A. J. Williams, "The Spectral Game: leveraging Open Data and crowd sourcing for education," *Journal of Cheminformatics*, 2009, 1:9. DOI: 10.1186/1758-2946-1-9.

* **P. T. Maragh,** "Reaction Mechanisms in Solution," *Ann. Rep. Prog. Chem., Section A: Inorganic Chemistry,* 2009, 105, 416-435.

* P. Ramírez, A. Granero, R. Andreu, A. Cuesta, **W. H. Mulder** and J. J. Calvente, "Potential of zero charge as a sensitive probe for the titration of ionizable self-assembled monolayers," *Electrochemistry Communications,* 2008, 10, 1548-1550.

* S. M. Antao, I. Hassan, **W. H. Mulder** and P. L. Lee, "The *R3c R* m transition in nitratine, $NaNO_3$, and implications for calcite, $CaCO_3$," *Physics and Chemistry of Minerals*, 2008, 35, 545-557.

* S. M. Antao, I. Hassan, **W. H. Mulder,** P. L. Lee and B. H. Toby, "In situ study of the *R3c R* m orientational disorder in calcite," *Physics and Chemistry of Minerals,* 2009, 36, 159-169.

* D. A. C. Biggs, **R. B. R. Porter** and W. F. Reynolds, "Abietane diterpenoids from *Hyptis verticillata,*" *Nat. Prod. Comm.,* 2009, 4, 15-18.

* G-A. Junor, **R. B. R. Porter,** T. H Yee and L. A. D. Williams, "Chemical composition and insecticidal activity of the essential oils from *Bursera hollickii* (Britton) found in Jamaica," *Journal of Essential Oil Research,* 2008, 20, 560-565.

* D. A. C. Biggs, **R. B. R. Porter,** W. F. Reynolds and L. A. D. Williams, "A new hyptadienic acid derivative from *Hyptis verticillata* with insecticidal activity," *Nat. Prod. Comm.,* 2008, 3, 1759-1763.

* A. S. Lamm, A. R. M. Chen, W. F. Reynolds and **P. B. Reese,** "Fungal hydroxylation of (-)-Santonin and its analogues," *J. Mol. Catal. B: Enzym.,* 2009, 59, 292-296.

* G. D. A. Martin, W. F. Reynolds and **P. B. Reese,** "Phytochemical Analysis of *Salvia coccinea* from Jamaican Populations," *Nat. Prod. Comm.*, 2009, 4, 789-790.

* **M. Singh-Wilmot**, I. Kahwa, A. J. White, D. J. Williams, A. Lough, *Polyhedron,* 2009. DOI: 10.1016/j.poly.2009.08.024.

Non-Referred

* **M. D. Coley,** J. James, H. Johnson and **A. Greenaway,** "Study of Caustic-soluble Chromium and Zinc in Jamalco bauxite." First Progress Report. May 2009. Alcoa World Technology Delivery Group.

* **R. J. Lancashire** and C. A. D. Walters, "Colour prediction with JSpecView" *The ChemSpider Journal of Chemistry,* 2009.

Patent Application

* P. C. Peart, A. R. M. Chen and *P. B. Reese* (inventors), UWI (assignee). "Method for biocatalysis using filamentous fungi." U.S. Patent pending (application 12/390,079; February 20, 2009).

Income Generation & Research Grants

Prof. T. Dasgupta

- **US$16,000.00** from United Nations University International Network on Water, Environment and Health for a project on *"Caribbean Costal Region Pollutants."*

Dr. W. Gallimore

- **£2,000** from the Royal Society of Chemistry for project entitled *"Mariculture of Bioactive Sponges."*

Drs. M. Coley & A. Greenaway

- **US$121,400.00** from Alcoa World Alumina (October 2008) for research project on *"Caustic-Soluble Chromium and Zinc in Jamalco Bauxite."* Project started October 1, 2008 and ends June 30, 2011.
- **US$1940.00** from the Mona Campus Committee for Research & Publications and Graduate Awards for the purchase of a micro-laboratory autotitrator.

Dr. A. Greenaway

- **US$2,500.00** from United Nations University International Network on Water, Environment and Health (November 2008) for collection of fish for testing for Persistent Organic Pollutants.
- **J$550,000.00** from commercial analyses.

Prof. Y. Jackson

- **US$1,300.00** from the Mona Campus Committee for Research & Publications and Graduate Awards (October 2008) for the project *"Synthesis of some Benzobisthiazoles and Thiazolobenzoxazoles"*.

Dr. D. Minott-Kates

- **J$2,189,709.00** for the Better Process Control School and **J$42,650.00** for Hypoglycin production.

Dr. R. Porter

- **$156,703.00** from Research and Publications and Graduate Awards for purchase of equipment/supplies for a project on the *"Investigation and Characterization of Natural Products."*

Prof. P. Reese

- **US$2,089.50** from the Mona Campus Committee for Research & Publications and Graduate Awards (October 2008) for project entitled *"The generation of analogues of betulinic acid by partial synthesis and fungal transformation."*
- **J$500,000** (equivalent US$5,680) from the Research Fellowship Committee (Special New Initiative Grant), Mona (May 2009) to fund project entitled *"Investigation of the biotransformation potential of endophytic fungi."*

Dr. N. Sadler-McKnight

- Generated a total of **J$2,572,300.00** from running laboratories for students at secondary institutions ($1,260,000.00), BEd (distance) Introductory and Advanced laboratories ($821,700.00), and the CAPE workshop ($490,600.00).

Other Income Generated

- Summer School – **$6,172,357.50**
- Sale of Liquid Nitrogen – **$114,280.00**
- Rental of Facilities – **$2,286,249.00**
- Consultation Fees – **$1,574,409.11**
- Analytical Services and Departmental Subventions – **$92,665.00**

PUBLIC SERVICE

Prof. M. Bakir

- Referee, to the Journals: Coordination Chemistry, Inorganic Chemical Communication and Polyhedron.

Prof. T. Dasgupta

- President, Caribbean Academy of Sciences
- Executive Committee Member, Regional Office of International Council of Science
- Member, Organizing Committee of UNITAR Project (Office of Prime Minister)
- Chairman, National Adhering Organization for IUPAC
- Member, POPs National Implementation Programme in Jamaica
- Member, International Panel of Academies
- Member, Third World Academy of Sciences
- Editor, Jamaican Journal of Science and Technology

Dr. H. Ellis

- Member, Bureau of Standards Jamaica Paints and Surfaces Committee.

Dr. W. Gallimore

- First Year Experience (FYE) Facilitator

Dr. A. Greenaway

- Member, National Ozone Commission.
- Chairperson, Laboratory Association of Jamaica's Subcommittee on Proficiency testing.
- Member, Bureau of Standards Jamaica/NEPA Phosphate Technical Committee.
- Member, Jamaica National Agency for Accreditation Technical Advisory Committee.
- External Examiner, Environmental Chemistry, College of Agriculture, Science and Education (CASE) Jamaica.

Prof. Y. Jackson

- Scientific Consultant, Tanaud International.
- Regional Editor, MOLECULES.
- Member, Board of Governors, Hampton School for Girls.
- First Year Experience (FYE) Facilitator

Prof. H. Jacobs

- Member, Ministry of Health and Environment's Technical Review Committee for Persistent Organic Pollutants (POPS).
- Member, University Council of Jamaica Board of Studies.

Prof. R. Lancashire

- Secretary, Caribbean Academy of Sciences.
- Titular Member and New Appointed Secretary (2010–2014), IUPAC Committee on Printed and Electronic Publications (CPEP).
- Member, IUPAC Sub-committee on Electronic Data Standards (SEDS).
- IUPAC representative on CODATA.
- Member, Advisory Group on ChemSpider.com.
- Editorial Advisory Board Member, Chemistry Central (chemistrycentral.com).

Dr. P. Maragh

- Assistant Chief Examiner CXC CSEC Chemistry
- External Examiner, for Chemistry – University of Technology
- External Examiner, for Chemistry – Joint Board for Teacher Education
- External Examiner, for Chemistry (Science & Technology) – MICO University
- External Examiner, for Chemistry – College of Agriculture, Science & Education

Dr. D. Minott-Kates

- Member, Interim Governing Body/Food Advisory Council.
- Vice Chaiman, CARICOM Regional Organization for Standards and Quality (CROSS-Q)

- Member, Coconut Water Technical Committee.
- Member, Scientific Research Council Board Sub-Committee for Food Technology.
- Board Member, Grove Primary School, Gordon Town.
- Member, WIGUT Management Committee.

Dr. W. Pinnock

- Faculty of Pure and Applied Sciences Rep. – University Hospital of the West Indies Research Ethics Committee.
- Board Member, National Water Resources Authority.
- Chairman, Technical Advisory Sub-Committee, National Water Resource Authority.

Dr. R. Porter

- Member, Technical Committee for Propane-Butane Liquefied Petroleum Gas standards, Bureau of Standards Jamaica.
- Member, Technical Committee (TC 93) for all standards relating to starch and its by-products, Bureau of Standards, Jamaica.
- First Year Experience (FYE) Facilitator

Prof. P. Reese

- Member, Equine Drug Testing Committee.
- Member, Product Research & Development Committee, Scientific Research Council.
- Board Member, Jamaica National Agency for Accreditation, Ministry of Industry, Technology, Energy & Commerce.
- Member, West Indies Group of University Teachers Executive Committee; Negotiating Committee
- First Year Experience (FYE) Facilitator

Dr. N. Sadler-McKnight

- Coordinator, CAPE Chemistry Workshop
- Executive Secretary, Chemistry Alumni and Friends (CHEMSAF)

- Member, Technical and Finance Committee of the Scientific Research Council (SRC)
- Faculty Advisor, UWI Circle K Club
- External Examiner, Chemistry, College of Agriculture, Science and Education (CASE)

Dr. M. Singh-Wilmot

- First Year Experience (FYE) Facilitator

DEPARTMENT OF COMPUTING

Daniel Coore, SB, SM, PhD – Head of Department

A New Beginning

In October 2008, the former Department of Mathematics and Computer Science was separated into a Department of Mathematics and a **Department of Computing**. The moniker "Computing" was chosen to reflect that "Computer Science" has come to have a narrower connotation of subject matter than in the past, and that the Department is interested in offering other computing programmes, such as Information Technology, Software Engineering, and Computer Engineering.

Staffing

All the staff members of the former Section of Computer Science (in the joint Department) were appointed in the newly established Department of Computing; no new staff members were appointed. **Mrs. Gunjan Mansingh** successfully defended her PhD (Information Systems) thesis dissertation. **Dr. Daniel Coore** was promoted to Senior Lecturer in April, 2009 with effect retroactively from August, 2006.

Work of the Department

One of the aims of our curriculum strengthening exercises has been to provide the means for increased exposure of our students to industry professionals and practices. To that end, we have actively engaged with an increased number of companies to achieve this aim. In September, 2008, two recent graduates were selected to participate in a 6 week internship with a leading Costa Rican IT company, named **Avantica.** The feedback from both the students and from Avantica was very positive. We had planned to repeat the experience this year, unfortunately the global recession caused Avantica to place those plans

on hold. The Department has also engaged with **Jamaica National Building Society** to provide consultative services and software to automate certain labour intensive processes; in June, 2009 we delivered the first version of a custom built tool for user acceptance testing. In December 2008, **Mr. Curtis Busby-Earle,** represented the Department at a sub-regional workshop on cyber security awareness, jointly hosted by the Inter-American Committee Against Terrorism (CICTE) and The Implementation Agency for Crime and Security. Out of that event, the Department, through Mr. Busby-Earle, was asked to provide input on a newly proposed **Cyber Crimes Act** in Jamaica. We also anticipate providing training and certification to professionals in cyber security, as a result of the eventual passing of the Act.

This year, for the first time ever, the Department offered both of its first year courses in both semesters; this provides some degree of flexibility to students from other programmes, as well as reduces the waiting time for a second sitting of a course, for those students who fail on their first attempt. A part of our strategy for improving research output is to encourage staff members to use the Summer period to push hard on their research agendas, or more generally to engage in useful activities – such as running a workshop or certificate course that is accessible to the wider community – that they would not normally be able to do while carrying their regular teaching loads. Unless there is strong demand for a specific course from eligible students, the Department no longer offers repeat courses in the Summer, which used to be primarily to facilitate students who had failed during the normal semester. Taken altogether: repeat core courses during the normal semesters, and encouragement for staff to use Summers primarily for research, we expect will lead to improved research output, without any significant change in student throughput. On other curricular matters, the Department also updated its MSc programme in December 2008, which is currently under review for final approval.

Research Activities

One of the most significant research projects that the Department has been involved with over the past year is the **Cardiac Surgery Simulator** project. The cardiac surgery simulator is to a cardiac surgeon what a flight simulator is to a pilot. Its central component is a pig's heart that is made to beat by the computer-controlled action of a pump that rhythmically inflates and deflates balloons inserted inside the heart. Other components that add to its realism are a computer-controlled

monitor to display vital sign traces (e.g. ECG, blood pressures, temperature) that are synchronised with the beating of the heart, a mock chest cavity to house the heart, and circulating red fluid to emulate the flow of blood into, and around, the heart. The simulator was invented in 2002 by Dr. Paul Ramphal, **Dr. Daniel Coore,** and Dr. Michael Craven. At the start of 2008, it received strong interest from the **American Board of Thoracic Surgery,** through its chairman, Dr. Richard Feins, who has since, provided much exposure for the simulator among the professional societies relevant to cardiac surgery in the USA.

In August 2008, the Mona campus, through appropriate legal representation, made an initial attempt to find a licensee to commercialise the simulator; but the recession in the USA at the time, made it difficult to attract a suitable offer. In early 2009, a decision was taken to leverage the strong interest in the simulator from the professionals who had seen it, by replicating the simulator in limited numbers, and placing a unit in strategically prominent teaching hospitals across the USA that have a strong cardiac surgery training programme. In April 2009, negotiations with eight (8) teaching hospitals began; these include: Mass. General Hospital (Harvard Medical School), Johns Hopkins University, Mayo Clinic, Vanderbilt University, Rochester University, University of North Carolina (Chapel Hill), University of Washington, and Stanford University. Negotiations are still underway; and in the meantime, the Department, through Dr. Coore, has taken the lead role in the development of a second version of the simulator to expand its functionality and to improve its usability. The negotiations are expected to be completed by the end of 2009, and production and delivery of the units within 3 months of signing the agreements.

Funding Awards

Dr. Ashley Hamilton-Taylor was awarded J$1.5 million in response to an application to the Campus's New Initiative Fund to establish the Web, Animation, Visualisation, and E-Learning (WAVE) Research Lab. **Dr. Suresh Sankaranarayanan** was awarded J$180,000 from the Research and Publications fund for a project investigating the performance of routing algorithms on wireless sensor-based mesh networks for health applications. The Department was awarded a UNESCO contract for US$39,500 to establish a Web based platform for the dissemination, exchange and application of science and technology.

PAPERS PRESENTED

- **Carl Beckford** and **Ezra K. Mugisa**: Towards Enhancement in Online Learning, in Ezra K. Mugisa (Editor) – Proceedings of the 1st Caribbean Conference on Information and Communications Technology (CCICT 2009), An International Conference on Information and Communications Technology Research, March 16-17, 2009, Mona, Kingston, Jamaica. pp 75-81.

- **C. Busby-Earle** and **E.K. Mugisa**: "Towards Writing Secure Software Requirements," in R. Breu (editor) – Proceedings of the IASTED International Conference SOFTWARE ENGINEERING (SE 2009), February 17-19, 2009, Innsbruck, Austria. pp 269-274, ACTA Press 2009.

- **P. Gaynor, D. Coore.** "A Strategy for Increased Data Reliability in Wireless Sensor Networks That Utilise Local Addressing", in Ezra K. Mugisa (Editor) – Proceedings of the 1st Caribbean Conference on Information and Communications Technology (CCICT 2009), March 16-17, 2009, Mona, Kingston, Jamaica. pp 14-18.

- **A. G. Hamilton-Taylor.** "Evaluating the Effectiveness, Costs and the Benefits of e-Learning in Developing and Developed Countries." In Ezra K. Mugisa (Editor) - Proceedings of the 1st Caribbean Conference on Information and Communications Technology (CCICT 2009), March 16-17, 2009, Mona, Kingston, Jamaica. pp 65-69.

- **G. Mansingh, L. Rao,** A. Mills. "A Demographic Profile of Current Internet Banking Users in Jamaica." In Ezra K. Mugisa (Editor) - Proceedings of the 1st Caribbean Conference on Information and Communications Technology (CCICT 2009), March 16-17, 2009, Mona, Kingston, Jamaica. pp 88-91.

- C. Allen and **E. Mugisa:** An Object Oriented Generic Learning Object Model (OOGLOM), in V. Uskov (editor) - Proceedings of the IASTED International Conference WEB-BASED EDUCATION, March 16-18, 2009, Phuket, Thailand, pages 106-112, ACTA Press 2009.

- **Ezra K. Mugisa** and **Carl Beckford**: "Conversion and Delivery of Courses via a Course Management System". In George

Papadopoulos and Roy Williams (Editors) – Proceedings of ECEL 2008, The 7th European Conference on e-Learning, November 6-7, 2008, Agia Napa, Cyprus, Book 2, pages 197-204, Academic Conferences International (ACI).

- L. Smith-Bailey and **S. Suresh,** "Intelligent Agent based Mobile Tour Planner." In Proceedings of First Caribbean Conference on Information and Communication Technology (CCICT 2009), Kingston, Jamaica, March 16-17, 2009. pp. 8-13.
- A.B. Ryan and **S. Suresh,** "Intelligent Agent based Mobile Shopper." In Proceedings of Sixth IFIP/IEEE International Conference on Wireless and Optical Communication Networks (WOCN 2009), Cairo, Egypt, April 24-28, 2009. ISBN: 978-1-4244-3474-9
- **S. Suresh**, " Hierarchical Intelligent Agent based Wireless Body Sensor Mesh Networks"- Proceedings of Sixth IEEE International conference on Information Technology- New Generations (ITng 2009), Las Vegas, USA, April 27-29, 2009. pp.1602-1603, ISBN: 978-0-7695-3596-8.
- **S. Suresh,** "Agent Based Information Routing in Wireless Body Sensor Mesh Networks." In Proceedings of Sixth IFIP/IEEE International Conference on Wireless and Optical Communication Networks (WOCN 2009), Cairo, Egypt, April 24-28, 2009. ISBN: 978-1-4244-3474-9.
- D. Barnes, **S. Suresh** and S. Ganesan, "Performance Analysis of Client/Server versus Agent based Communication in Wireless Sensor Networks for health applications." IEEE Electro Information Technology (EIT-09), Windsor, Canada, June 7-9, 2009. pp. 271-276. ISBN: 978-1-4244-3355-1
- **D. Coore,** "Impacting Education with ICT." ICT4D Jamaica Stakeholders' Conference. Kingston, Jamaica. March 19, 2009.
- **D. Coore,** "A Case Study in Software Development for Mobile Services." Caribbean ITS Regional Conference 2009. June 23-26, 2009.
- **A. G. Hamilton-Taylor,** "Information and Communications Technology in Africa and the Disapora: Development or

Underdevelopment." Pan African Summit, Atlanta, GA, July 2009.

PUBLICATIONS

Books

* **Ezra K. Mugisa** (Editor): Proceedings of the 1st Caribbean Conference on Information and Communications Technology(CCICT 2009), An International Conference on Information and Communications Technology Research, March 16-17, 2009, Mona, Kingston, Jamaica. Caribbean Academy of Sciences (CAS), 2009.

Journal Articles

* **S. Suresh** and S. Ganesan, "A Layered Architecture for Agent based Wireless Sensor Mesh Networks- Applications in Health Care", *International Journal for Embedded Systems and Computer Engineering, Serial Publications,*Vol.1(1), pp. 51-61, 2009.

Student Throughput

A total of 54 students graduated from one of our two undergraduate programmes. This represented a decrease from 72 in academic year 2007-2008. There were 37 students from the Faculty of Pure and Applied Sciences and 12 students from the Faculty of Humanities and Education who completed the Computer Science major and 5 (in FPAS) who completed the Computer Studies Option (a programme that allows a combination of courses from Management Studies and Mathematics to be taken together with a particular selection from the Computer Science major). These numbers are further broken down by gender and class of degree as follows:

Programme Faculty Gender	BA Computer Science			BSc Computer Science			BSc Computer Studies Option		
	FHE			FPAS			FPAS		
	M	F	Total	M	F	Total	M	F	Total
1st Class	0	0	0	0	1	1	0	0	0
Upper 2nd	1	0	1	2	3	5	0	4	4
Lower 2nd	2	2	4	8	4	12	1	0	1
Pass	3	4	7	15	4	19	0	0	0
Total	**6**	**6**	**12**	**25**	**12**	**37**	**1**	**4**	**5**

Awards

Mr. Curtis Busby-Earle was recognised as an ACM[1] Senior Member. This award "recognises those ACM members with at least 10 years of professional experience and 5 years of continuous Professional Membership who have demonstrated performance that sets them apart from their peers." [ACM Awards Web site[2]]. **Dr. Daniel Coore** received SRC national innovation awards (best in category, and overall runner-up) for the cardiac surgery simulator in October, 2008. The Department was pleased to grant the Dr. Karl Robinson Award, for the best performance in Computer Science courses up to Semester 1 of year 3 in the programme, jointly to **Miss Kimberly Simon** and **Mr. Matthew Budram.**

DEPARTMENT OF GEOGRAPHY AND GEOLOGY

Professor David Barker, BSc *Wales,* **PhD** *Bristol,*
Dip Urb & Reg Studies *Birmingham* **– Head of Department**

WORK OF THE DEPARTMENT

The Department mounted a full programme of undergraduate teaching in Geography and Geology, and supervised and facilitated an active and vibrant group of postgraduate research students in the two disciplines. For several years now, the Department has faced considerable challenges in fulfilling this commitment, due to staff retirements and resignations and the related difficulties of recruiting qualified specialist lecturers. Budgetary constraints and limited teaching space were additional challenges, although some progress was made in acquiring additional scientific equipment for teaching, and in establishing and managing audio-visual facilities in our teaching laboratories.

Dr Michael Burn joined the Department in December as lecturer in Geography, specializing in climate change research. **Mr Kevon Rhiney** continued as temporary assistant lecturer in Human Geography. **Dr Sherene James-Williamson** joined the staff in April as curator of the Geology Museum. The departures included **Dr Balfour Spence** and **Dr Savitha Ganapathy,** lecturers in Geography, who resigned their posts, as did **Dr Margaret Wiggins-Grandison**, head of the Earthquake Unit. **Mr Paul Williams** was appointed as Acting Head of the Earthquake Unit.

Student numbers in first-year Geology (specifically, GEOL1001 in Semester 1) suddenly and unexpectedly increased by more than 50%. These increased numbers created serious difficulties in practical classes as a third laboratory stream was needed. The problem of increased staff workloads was compounded by a shortage of demonstrators/teaching assistance. It also created pressure on teaching space and scientific

equipment. An acute shortage of microscopes needed to be urgently addressed. The number of students in second- and third-year Geology was slightly lower. In Geography, second-year student numbers were higher and final-year numbers were slightly lower as the abnormally small entry from the Faculty of Humanities and Education in 2006/07 went into their final year.

Professor Simon Mitchell served as Associate Dean for Graduate Studies in the Faculty of Pure and Applied Sciences for the 2008/2009 academic year. He presented his inaugural professorial lecture on "Making a mark in the rocks" in October 2008.

Professor David Barker again delivered the second-year Agricultural Geography course at the St Augustine campus in Semester II.

The Geography section of the Department (staff and postgraduate students) was well represented at the Annual Meeting of the Association of American Geographers held in Las Vegas, Nevada, in March 2009. Apart from papers presented (details below), Professor David Barker and Dr Clinton Beckford (a graduate of the Department now Acting Dean at the University of Windsor, Canada) organized a panel discussion at the conference on "Directions in Caribbean Geographical Research", while **Dr Susan Mains** organized two panel discussions, on "Media(ting) Migration: Mobility, Inclusion and Popular Culture" and "Postcolonial Migrations." **Professor Barker** also organized a panel discussion on "Global Change, Food Security and Agricultural Development: Vulnerability and Adaptation among Caribbean Small Farmers" at the Conference on Food Security and Agricultural Development held on the Mona campus in July 2009.

Professor Mitchell and Dr. Peter Skelton (The Open University, UK) were invited to the Smithsonian Institution in Washington, D.C. for two weeks to review the rudist bivalve fossil collections, and received a grant of US$2,500 each to cover transport and accommodation from the Smithsonian. **Professor Mitchell** also spent three weeks working on the rudist bivalve collections at the Texas Memorial Museum, Austin (Texas) as part of a National Science Foundation Grant to produce a digital online access facility for the collections.

Dr Susan Mains and Dr Tracy Skelton were Guest Editors for the July 2009 issue of *The Singapore Journal of Tropical Geography* (Vol. 30). The Department continued to be the home base of two local, peer-reviewed journals, *Caribbean Geography* and *Caribbean Journal of Earth Sciences,*

the former edited by **Professor David Barker** and the latter by **Professor Simon Mitchell** and **Dr Tom Stemann.**

The Unit for Disaster Studies (**Mr Rafi Ahmad**), in collaboration with the Norwegian Geotechnical Institute (Oddvar Kjekstad), Norway, and the Mona Geoinformatics Institute (**Dr Parris Lyew-Ayee**), successfully completed a two-year collaborative project aimed at capacity building in natural disaster mitigation. The focus of the project was mapping and modelling landslide and tsunami hazards in the Caribbean region. The final Seminar on Natural Disaster Mitigation in the Caribbean was held on December 4-5, 2008 at the University of the West Indies, Cave Hill Campus, Barbados, to present the results of the Regional Mapping of Landslide and Tsunami Hazards in the Caribbean.

More than 800 Jamaican schoolchildren visited the Geology Museum in the course of the year. Following the appointment of a new museum curator, an innovative programme of educational activities has begun. A workshop/seminar for visitors from Barbados was organized in July. A collection of 135 agate items was donated to the museum by Anthony Porter. More than 500 new specimens have been accessed and labelled in a major overhaul of the museum collection's data base and cataloguing system.

The Department continued to administer the Earthquake Unit, the Unit for Disaster Studies, and the Marine Geology Unit.

INCOME GENERATION

The consultancy project with the Ministry of Agriculture and Lands – "Consultancy Agreement on the Cockpit Country Boundary Study" – which began in 2007 was completed. The project's budget was J$1.8 million. The main investigator was **Professor Simon Mitchell,** and the co-investigators were **Dr David Miller, Dr Savitha Ganapathy** and **Dr Balfour Spence.**

PAPERS PRESENTED

D. Barker

- (with D. McGregor & D. Campbell). "Environmental change and Caribbean food security: recent hazard impacts and domestic food production in Jamaica."Annual Conference of

the Royal Geographical Society/Institute of British Geographers, Kings College, University of London, August 2008.

- (with D, McGregor & D. Campbell). "Environmental change and Caribbean food security: recent hazard impacts and domestic food production in Jamaica." International Conference on The World Food Crisis and the Global South, Institute for the Study of the Americas/School of Oriental and African Studies, University of London, January 2009.
- (with D. Campbell). "Hazards and agriculture: a comparison of Jamaican farmers' vulnerability and adaptation to hurricanes and drought." Annual Meeting, Association of American Geographers, Las Vegas, Nevada, USA, March 2009.
- "Perspectives on global change and food security in the context of domestic agriculture in Jamaica and the wider Caribbean." Conference on Food Security and Agricultural Development, UWI, Mona, July 2009.

S. Ganapathy

- "Forest fire dynamics and fire-risk mapping in tropical forests of Jamaica using GIS and remote sensing". Annual Meeting, Association of American Geographers, Las Vegas, Nevada, USA, March 2009.

S. James-Williamson

- (with I. McLymont-Lafayette, N. Douglas & S. Swaby). "Voices for climate change education: a national climate change communication strategy." 4th Biennial Conference on the Environment 2009, Kingston, Jamaica, May 2009.

S. Mains

- "Returning to Jamaica: representing urban spaces of diaspora and development." Annual Meeting, Association of American Geographers, Las Vegas, Nevada, USA, March 2009.
- "Rethinking Caribbean urban identities: 'return' and diaspora cities." 2nd Annual Anthropology Day, UWI, Mona, March 2009.

D. Miller

- ·"Beach morphology and sediment dynamics on a carbonate beach: Manatee Bay, St Catherine, Jamaica." Annual Meeting, Association of American Geographers, Las Vegas, Nevada, USA, March 2009.

S. Mitchell

- "Late Cretaceous rudist biostratigraphy of the Caribbean region – correlation of shallow platform carbonate/volcanic successions." Third Cuban Earth Science Convention, Havana, Cuba, March 2009.
- (with R. Ramsook). "Rift basins in Jamaica: sedimentary architecture and basin development." Third Cuban Earth Science Convention, Havana, Cuba, March 2009.

K. Rhiney

- "Trench Town rock: reggae music, identity and place contestations in Trench Town, Kingston." Annual Meeting, Association of American Geographers, Las Vegas, Nevada, USA, March 2009.
- (with D. Campbell). "Boosting local capacity and strengthening linkages: farmers' groups and their supply links with the Jamaican tourist industry." Conference on Food Security and Agricultural Developments in the Americas, UWI, Mona, July 2009.

E. Robinson

- (with S. Khan, D. Rowe & R. Coutou). "Size of shoreline boulders moved and emplaced by recent hurricanes, Jamaica." Second International Tsunami Field Symposium, UNESCO/IGCP Project 496. Italy & Greece, September 2008.
- (with S. Khan, D. Rowe, R. Coutou & M. Johnson). "Emplacement and evolution of debris deposits on coastal platforms, Jamaica. 26th Regional IAS/SEPM Meeting, Bochum, September 2008.

- (with S. Khan). "Presentation of draft report on Second Communication to UNFCCC: Coastal Resources including Human Settlements." UNFCCC Workshop, October 2008.

T. Stemann

- "Tracing the robust and complex coral clades into the Eocene and Paleocene." Encyclopedia of Life/Biodiversity Synthesis Group Workshop on The Systematics and Evolution of Scleractinian Corals, Smithsonial Institution, Washington, D.C., USA.

PUBLICATIONS

D. Barker

* D. Barker (ed.), *Caribbean Geography,* Volume 15, Issues 1 and 2, 2008/2009.

S. Mains

* (with T. Skelton (guest editors), "Special Section on Neoliberalism, Mobilities and Development: Caribbean Intersections," *The Singapore Journal of Tropical Geography,* 30, 2009.

* "Representing Cultural Geographies of Jamaica," *Caribbean Geography,* (15(1), 2008.

T. Stemann, S. Mitchell

* *Caribbean Journal of Earth Science* (40), 2009.

Refereed Book Chapters and Journal Articles

D. Barker

* (with C. Beckford). "Agricultural intensification in Jamaican small-scale farming systems: vulnerability, sustainability and global change." *Caribbean Geography*, 15(2), 2008, 160-170.

M. Burn

* (with F.Mayle, M. Power & D. Urrego). "Vegetation and fire at the last glacial maximum in tropical South America." F. Vimeux *et al.* (eds.), Past Climate Variability in South

America and Surrounding Regions. Developments in Paleoenvironmental Research, 14, Springer.

S. Mains

* "Access to justice." J.A. O'Brien (ed.), Encyclopedia of Gender and Society, 1: 6-8, 2009. Thousand Oaks, California: Sage.

* "Development: cultural imperialism." R. Kitchin & N. Thrift (eds.), International Encyclopedia of Human Geography, 2009. Oxford: Elsevier.

* "'English fever': documenting the Caribbean diaspora in 'The Colony'." A. Escher, A.C. Lukinbeal & S. Zimmerman (eds.), The Geography of Cinema – A Cinematic World, 2008, 137-153. Stuttgart: Franz Steiner-Verlag.

* (with T. Skelton). "Intersections of neoliberalism, mobilities and development in the Caribbean: an introduction." *The Singapore Journal of Tropical Geography,* 30, 2009, 151-157.

* "Island village, tourist world: representing cultural geographies of Jamaica." *Caribbean Geography,* 15(1), 2008, 1-13.

S. Mitchell

* (with J. Collins, & S. Donovan). "A new species of land crab, Sesarma Say (Decapoda, Brachyura), from the Pleistocene of Jamaica." *Scripta Geologica*, 138, 2009, 11-21.

* (with S. Gotz). "The Laluzia armini (gen. et spec. nov.) ecosystem: understanding a deeper-water rudist lithosome from the Early Maastrichtian of Mexico." *Facies* (DOI 10.1007/s10347-009-0184-6).

* (with H. Loser & T. Stemann). "Oldest scleractinian fauna from Jamaica (Hauterivian Benbow Inlier)." *Journal of Paleontology*, 83, 2009, 333-349.

* "A new rudist from the Santonian of Jamaica." *Caribbean Journal of Earth Science,* 40, 2009, 15-20.

* "Discussion of *Campanile trevorjacksoni* sp. Nov. (Mollusca: Gastropoda) from the Eocene of Jamaica – at last, a name for the first fossil used in intercontinental biostratigraphic

correlation (de la Beche 1827): (v. 43, pp. 542-551)." *Geological Journal*, 44, 2009, 494-496.

* (with R. Ramsook). "Rudist bivalve assemblages from the Back Rio Grande Formation (Campanian, Cretaceous) of Jamaica and their stratigraphical significance." *Cretaceous Research,* 30, 2009, 307-321.

K. Rhiney

* "Forging new linkages in a changing global economy? The case of cooperatives and their link with the Negril tourism industry." *Caribbean Geography,* 15(2), 2008, 142-159.

E. Robinson

* (with R. Ramsook). "A new record of the Paleocene larger foraminifer *Ranikothalia catenula* in the Wagwater Formation of eastern Jamaica." *Caribbean Journal of Earth Science,* 40, 2009, 21-23.

T. Stemann

* (with J. Collins & S. Donovan). "Fossil crustacean of the Late Pleistocene Port Morant Formation, west Port Morant harbor, southeastern Jamaica." *Scripta Geologica,* 138, 2009, 23-53.

* (with H. Loser & S. Mitchell). "Oldest scleractinian fauna from Jamaica (Hauterivian, Benbow Inlier)." *Journal of Paleontology*, 83, 2009, 333-349.

PUBLIC SERVICE

D. Barker

– Convenor, CAPE Geography

– President, Jamaican Geographical Society.

S. James-Williamson

– Member, Council, Jamaica Institute of Environmental Professionals.

– Vice-Chair and Treasurer, National Environmental Education Committee.

- Member, Steering Committee, NEEC/PANOS Caribbean Climate Change Project.
- Member, Executive Council, Geological Society of Jamaica.
- Member, Publications Committee, Natural History Museum of Jamaica, Institute of Jamaica.

S. Mains

- Board member, Qualitative Research Specialty Group, Association of American Geographers.
- Member, Association of American Geographers International Research across the Americas Advisory Group.
- Editor, *People, Place, Praxis: Qualitative Research in Geography Specialty Group Newsletter.*
- Council member, Jamaica Geographical Society.
- Member of the Editorial Boards, *Aether: The Journal of Media Geography; The Spaces of Democracy and Democracy of Space Journal; Revista Brasileira do Caribe.*

S. Mitchell

- Permanent member, Standing Committee for the Caribbean Geological Conferences.
- Member, Scientific Committee, International Rudist Congress.
- Chairman, Commission on Jamaican Lithostratigraphy.
- Editor, *Caribbean Journal of Earth Science.*
- Member, Executive Council, Geological Society of Jamaica.

CATEGORIES OF STUDENTS

Undergraduate Students: Geography

Year I:	93
Year II:	60
Year III:	26

Undergraduate Students: Geology

Year I:	165
Year II:	39
Year III:	31

Postgraduates:

MPhil Geography:	5 (1 completed)
MPhil Geology:	5
PhD Geography:	9
PhD Geology:	1

DEPARTMENT OF LIFE SCIENCES

Eric Hyslop, BSc(Hons.) *Aberdeen*, **PhD** *Open University*
– Head of Department

WORK OF THE DEPARTMENT

Again 2008-2009 was a year which saw major changes and again principally these were concerned with expansion of student intake in the undergraduate programme, particularly at level I.

Department's performance during 2008/2009

Undergraduate programme

In level I courses the average enrolment increased from 419 in 2007-2008 to 506 in 2008-2009. Again this placed severe strain on the resources of the department, particularly on the physical space. Equipment shortfalls were to some extent mitigated by acquisition throughout the academic year, although delays in receipt of materials were unhelpful. Similarly average enrolment in level 2 courses increased from 116 in 2007/8 to 154 in 2008/9 with corresponding implications for the resources and in particular for the operation of field courses

The Marine Biology major was offered for the first time and the course Caribbean Biodiversity, BL39D/BIOL3019, was reinstated at level III.

Undergraduate teaching

Using student assessment as the defining criterion, the Department of Life Sciences was once again able to maintain a very high standard of teaching with the lecturer mean value in both semesters I and II at 4.2 (Ranges: semester I: 3.0 - 4.8; semester II: 3.2 – 4.8). In addition, the course mean values were also similar and high in both semesters at 3.85 and 3.81 respectively (Ranges: semester I: 3.4 - 4.3, semester II: 3.5 –

4.2). Several staff members consistently scored above 4.5 in all their assessments.

Staffing Developments and Awards

Three members of staff were promoted to senior lecturer in 2008-2009: Dr. Karl Aiken, Dr. Eric Garraway and Dr. Paula Tennant. Drs. Kurt McLaren and Byron Wilson were co-recipients of the Principal's award for the research project which attracted the most external funding, for the project "Habitat and biodiversity conservation in the Cockpit Country and Black River morass of Jamaica" funded by the MacArthur Foundation. Dr Judith Mendes received a J$60,000,000 EDULINK grant to promote education on coral reefs.

Graduate programme

The Department of Life Sciences finalized a cohort of students in the MSc Plant Production and Protection but was unable to proceed with a new intake into the merged environmentally based MSc due to delays in programme although these administrative difficulties were overcome during the course of the year and the programme will be offered in the 2009-2010 academic year as MSc MATE (Marine and Terrestrial Ecosystems: Assessment, Conservation and Management).

In terms of research students, five new students were admitted to the department's various MPhil programmes and one candidate successfully transferred from MPhil to PhD Four PhD theses were successfully defended during the 2008-2009 academic year.

Sixteen persons graduated with postgraduate qualifications in November 2009.

Outreach

Pre-University School October 9, 2008 – February 26, 2009 CAPE and CSEC Laboratory Sessions (110 students)	the department earned **$221,240.00**
Caribbean International College December 22-29, 2008 CAPE Laboratory Sessions (18 students)	the department earned **$26,000.00**

The Centre for Marine Sciences (CMS) was co-sponsor of a meeting of the Jamaica Institute of Environmental Professionals held May 26th and 27th, 2009 in the Pegasus Hotel, Kingston

The Department of Life Sciences hosted a workshop in conjunction with the Fairchild Tropical Botanical Garden, Centre for Tropical Plant Conservation on Conservation Genetics and Molecular Biology from 13th to 24th July, 2009, this was attended by graduate students and interested researchers in government departments and NGO's.

The Discovery Bay Marine Lab continues to provide services via the recompression chamber which is in the process of being refitted.

The Port Royal Marine Laboratory made good progress in the establishment of a "Mangrove Biodiversity Centre" throughout the year. In addition, the establishment of a coastal plant nursery, to produce stock for the replanting of the Palisadoes and surrounding areas is showing rapid advances. General landscaping and planting of the area around the lab is also progressing well. All of these developments when completed will help increase the attractiveness of the facility as a venue for promoting environmental awareness among visitors.

Research Output In 2008-2009

The research output of the department consisted of 17 articles in referred journals and 20 conference presentations, a number of which were given at international conferences overseas. The publication rate of a few individuals is particularly impressive, but some persons are not publishing as they should. The crude average, based upon 16 academic staff at Mona and 4 at Scientific Officer level or above, a total of 20 staff, gives an average of 1.85 publications, somewhat down on the 2.8 recorded in the 2007-8 departmental report. However the research output in terms of refereed journal papers is 0.85, still low, but an improvement on the previous year's mean of 0.55.

Achievement of 2008/9 targets

The department was unable to finalize changes to the level 2 and 3 courses in the undergraduate programme although we did achieve success in maintaining teaching standards in the face of expanded numbers. Both Port Royal and Discovery Bay Marine labs continued to accommodate students and researchers. The latter showed a 31%

increase in visitor numbers in 2008/9 with 1703 visitors as compared to 1302 in the previous year. A total of 718 students from 23 schools visited in 2008/9 compared to 583 from 14 schools in 2007/8 Port Royal Marine lab continues to offer Mangrove and Kingston Harbour tours to schools. 558 visitors from a variety of educational institutions were hosted during January to May 2009. The surrounding mangrove wetland is used by many high schools to satisfy the School Based Assessment component of CSEC. International Coastal clean-up activities, World Wetland's Day and mangrove replanting activities were also hosted out of the laboratory.

Research Based targets

Referee based publication average increased from 0.55 to 0.85 per staff member although, as noted above the increase was not evenly spread. Some graduate students were able to present their work at internationally credible conferences but again this was limited to a few individuals. Administrative difficulties prevented implementation of the new environmentally based MSc.

Targets for 2009/10

- To examine and modify accordingly the level 2 and 3 curriculum in the undergraduate programme.
- To implement teaching of the MSc (MATE)
- To expand infrastructure in the light of increasing enrolment in the undergraduate programme.
- To continue expansion of facilities at Port Royal Marine Lab with a view to improving its effectiveness as a venue to promote environmental awareness

Research Based Targets for 2009/10

- To increase throughput rate of students in research based postgraduate programmes
- To increase average staff publication rate in peer reviewed journals.
- To further encourage research students to present their findings at international conferences.

PAPERS PRESENTED

Karl Aiken

- (with Pal, A.R. & Perry, G.A.). "Fish nurseries in Kingston Harbour, Jamaica: do they still exist?" 61st Annual Gulf & Caribbean Fisheries Institute Meeting, 10-14 Nov. 2008, Basseterre, Guadeloupe, French West Indies.

Noureddine Benkeblia

- "Determination of respiratory parameters of onion bulbs (Allium cepa L.) under total anoxia'. 6th Controlled and Modified Atmosphere Research Conference, April 4-7, 2009 Antalya, Turkey.
- (with Shiomi, N.). "Variation of fructooligosaccharide contents, invertase, 1-KHE, 1-SST, 1-FFT and 6G-FFT activities in green asparagus spears stored at 10oc". 10th International Postharvest Symposium, April 8-12, 2009 Antalya, Turkey.
- (with Kudo, K., Onodera, O., and Shiomi, N.). "Antioxidant properties of peptides isolated from potato protein hydrolysate". 17th Annual Research Conference, November 12-14, 2008, UWI, Kingston Jamaica.

Frederick Boyd

- Gender differences in Pimenta. Dioica (L.) Merr. Plant Biology 2009, Joint Annual Meeting of American Society of Plant Biologists & Phycological Society of America July 19-22 Honolulu, HA, (2009).

Jane Cohen

- (with Steen, S., Benkeblia, N.)(2009). Effects of the plant growth regulator, Stimulate TM , on some postharvest qualities of tomato grown in tropical greenhouses. 6th International Postharvest Symposium, ISHS. 8-12 April, Antalya Turkey.

Eric Hyslop

- (with Fender-Longman, A.)(2009). The effect of the invasive snails *Thiara granifera* and *Melanoides tuberculata* on the

endemic *Hemisinus lineolatus* in Jamaica. International symposium of the Freshwater Mollusk Conservation Society, April 19-24 Baltimore USA .

Paula Tennant

- (with Powel, M., Wheatley, A.O., Omoruyi F., Asemota, H. N., Williams, N.P.). "Safety assessment of transgenic crops modified for protection against plant viruses: The papaya case study. Food Safety and Security, the Future". Knutsford Court Hotel, Kingston, Jamaica, July 30-31, 2009.
- (with Fisher, L.C., & McLaughlin, W.A.). "Detection of Citrus tristeza virus (CTV) in citrus using Serological and Molecular Tools. Food security and agricultural development in the Americas". Mona Visitor's Lodge and Conference Centre, University of the West Indies, July 28-30, 2009.
- (with Fisher, L.C., & McLaughlin, W.A.). "New occurrences of Citrus tristeza virus stem pitting strains in Jamaica". Caribbean Agriculture and Food in a Changing Global Context. University of the West Indies, March 3, 2009.

Dale Webber

- (with Wilmot, I.K.). "Phytoplankton distribution and circulation in Foul and Folly bays St. Thomas on the Southeast Coast of Jamaica". Association of Marine Laboratories of the Caribbean Conference, May 2009, Dominica.

Mona Webber

- (with Persad, G.). "Modelling trophic interactions in the zooplankton community of Discovery Bay, Jamaica: a new application of Ecopath software". Association of Marine Labs of the Caribbean Conference. May 2009. Dominica.
- (with Henry, D., and Webber, D.F.) "Sea urchin abundance and distribution in the Port Royal cays area, Jamaica". Association of Marine Labs of the Caribbean Conference. May 2009. Dominica.
- (with Chin, D., Mendes, J., and Webber, D.F.). "A description of the coral reef community of foul and folly bay, Morant

Wetlands Jamaica". Association of Marine Laboratories of the Caribbean Conference, May 2009, Dominica.

- (with Harris, N.). Zooplankton as indicators of water quality in foul and folly bays, Morant wetlands area, Jamaica. Association of Marine Laboratories of the Caribbean Conference, May 2009, Dominica.
- (with Foster, A. & Webber, D.F.). "Seagrass distribution in Foul and Folly bays, Morant Wetland, Jamaica". Association of Marine Laboratories of the Caribbean Conference, May 2009, Dominica.

Byron Wilson

- (with Van Veen, R.). "Taxon report for Jamaican Iguana", annual meeting of the IUCN Iguana Specialist Group, at White Oak Conservation Centre, Jacksonville, Florida. 2008.
- "Conservation status of Jamaican amphibians and reptiles". 8th Latin-American Congress of Herpetology. Varadero, Cuba. Pp. 103-104. 2008.

PUBLICATIONS

Refereed Journal Articles

* **Benkeblia, N.,** Alexopoulos AA, Passam HC. (2008). Physiology and biochemistry regulation of dormancy and sprouting in potato tuber *(Solanum tuberosum L.) FOOD 2:* 54-68.

* Kudo, K., Onodera, S., Takeda, Y., **Benkeblia, N.,** and Shiomi N. (2009). Antioxidative activities of some peptides isolated from hydrolyzed potato protein extract. *Journal of Functional Food* **1:** 170-176.

* Fujishima, M., Furuyama, K., Ishihuro, Y., Onodera, S., Fukushi, E., **Benkeblia, N.,** Shiomi, N. (2009). Isolation and structural analysis in vivo of newly synthesized fructooligosaccharides in onion bulbs tissues (Allium cepa L.) during storage. *International Journal of Carbohydrate Chemistry*, 1: 1-9

* **Benkeblia, N.** and Shiomi, N. (2009). Variation of fructooligosaccharide contents, invertase, 1-SST, 1-FFT and 6G-FFT activities in green asparagus spears stored under different temperature regimes. *Fresh Produce* 3: 44-50.

* **Benkeblia, N.** (2009). Postharvest biology and technologies of *Allium crops.* In: **N. Benkeblia** (Editor). Advances in Postharvest Technology for Horticultural Crops. Vol. 2. Research Signpost Publisher, Kerala, pp. 229-250.

* Williams, K. T., **Coates-Beckford, P.L.** (2007). Nematodes and fungi associated with roots of *Carica papaya* L. cv. Solo in Jamaica and the influence of plastic mulches on their occurrence and plant vigour. *Tropical Agriculture* (Trinidad) 84:91-103

* Tennant, P., Robinson, D., Fisher, L., Bennett, S., Hutton, D., **Coates-Beckford, P.L.,** McLauglin, W. (2009). Diseases and pests of citrus *(Citrus spp.)*. In Benkeblia, N., and Tennant, P. (Editors). Citrus III. *Tree and Forestry Science and Biotechnology,* Volume 3 (Special Issue 2). 81-107

* **Garraway, E.,** Murphy, C.P., and Allen, G. 2009 Pailio demoleus (the Lime Swallowtail) (Lepidoptera: Papilionidae), a potential pest of citrus, expanding its range in the Caribbean. *Tropical Lepidoptera,* 19: 58-58.

* **Tennant, P.F.,** Robinson, R., Fisher, L., Bennett, S., Hutton, D., Coates-Beckford, P.L., McLauglin, W. (2009). Diseases and pests of citrus *(Citrus spp.)*. Tennant, P.F., Benkeblia, N, (Eds) Citrus III. *Tree and Forestry Science and Biotechnology,* Vol.3, (Special Issue 2). 81-107

* Chin, M., Rhodes, L., **Tennant, P** (2008) Occurrence of Papaya ringspot virus in papaya orchards of St. Kitts. *Plant Pathology* 57: 767 (*New Disease Reports [http://www.bspp.org.uk/ndr/]* Volume 16.)

* Powell, M., Wheatley, A., Omoruyi, F., Asemota, H., Williams, N.P., **Tennant, P.F.** (2008) Effects of subchronic exposure to transgenic papayas *(Carica papaya L.)* on liver and kidney enzymes and lipid parameters in rats. *Journal of the Science of Food and Agriculture* 88:2638-2647

* Roberts, M., Minott, D.A., **Tennant, P.F.**, and Jackson, J.C. (2008) Assessment of compositional changes during ripening of transgenic papaya modified for protection against *Papaya ringspot virus*. *Journal of the Science of Food and Agriculture* 88: 1911-1920

* Boyd. F., **Tennant, P.F.**, Persad, G, Robinson, D., McLaren, I (2008) Student perceptions and outcomes of a WAC intervention exercise in an introductory biology course. *Caribbean Journal of Education* 30:217-247

* Campbell, P., Manning, J., **Webber, M.K.,** Webber, D.F. (2008) Planktonic communities as indicators of water quality in Jamaican mangrove lagoons: a case study. *Transitional Waters Bulletin* Vol.3 (2008), 39-63

* Gribbins, K.M., Rheubert, J.L., Poldemann, E.H., Collier, M.H., **Wilson, B.**, and Wolf, K. 2009. Continuous spermatogenesis and the germ cell development strategy within the testis of the Jamaican Gray Anole, *Anolis lineatopus*. *Theriogenology* 72:484-492.

* Lewis, D.S., Vogel, P., and **Wilson, B.** 2008. Survival, dispersal, and home range of headstarted Jamaican iguanas, Cyclura collie. *Caribbean Journal of Science* 44:423-425.

* Hailey, A., **Wilson, B.S.**, and Horrocks, J.A. (eds) 2009. Conservation of Caribbean Island Herpetofaunas, Part 5. *Applied Herpetology* 6:103-149.

Technical reports and Non-refereed Articles

* **Aiken, K.A.,** and Pal, A.R. 2008 "Dolphin interference with fish traps in Jamaican waters". Proc. Gulf & Caribbean Fisheries Instit., Punta Cana, Dominican Republic, Vol.60:269-281, Fort Pierce, Florida, Libr. Of Congress Card Number 52-033783; ISSN Number 1553-8486.

* **Wilson, B.S** 2008. Battling invasive predators to save the Jamaican iguana. Aliens of Xamayca 1:2.

Book Chapters and Editorships

* **Benkeblia, N.,** and Tennant, P. (Guest Editors) (2008). **Special Issue: Potato I.** *Fruit, Vegetable and Cereal Science and Biotechnology 2(1),* ***GSB Publisher,*** Isleworth (UK), pp 1-55.

* **Benkeblia, N.,** and Tennant, P. (Guest Editors) (2008). **Special Issue: Citrus I.** *Tree and forestry Science and Biotechnology,* ***GSB Publisher,*** Isleworth (UK), 2(1), pp 1-44

* Tennant, P and **Benkeblia, N.** (Guest Editors) (2009). **Special Issue: Potato II.** F*ruit, Vegetable and Cereal Science and Biotechnology,* ***GSB Publisher*** (UK, 3(1), pp1-39.

* Tennant, P and **Benkeblia, N**. (Guest Editors) (2009). **Special Issue: Citrus II.** *Tree and forestry Science and Biotechnology,* ***GSB Publisher,*** (UK), 3(1), pp 1-169.

* **Tennant, P.F.**, and Benkeblia, N. (Eds) (2009). **Special Issue Citrus III.** *Tree and Forestry Science and Biotechnology,* Vol., 3 (Special Issue 2), 142 pp.

* **Benkeblia, N.** (Editor) (2009). Advances in Postharvest Technology for Horticultural Crops. **Vol. 2. Research Signpost Publisher,** Kerala, 265 p.

* **Robinson, R.D.** (2009). What to look for under the sea. Reprinted under copyright in: Ramsey PA, Harding V, Cools JA and McLaren IA (2009) "Blooming with the pouis: a rhetorical reader for Caribbean tertiary students." Chapter 20 (pp.95-97). Ian Randall Publishers.

* Fernandez, E. (2009) "Jamaica. A photographic journey through the land of wood and water." **Wilson, B** (ed.) IMCA Jamaica Ltd. 336pp.

INCOME GENERATION

Research Funding

EDULINK grant (**Dr. Judith Mendes**)	**E488,000.00**
Graduate Awards Funds	**(J$252,831.68**

(All Dr. Byron Wilson)

Disney Wildlife Conservation Fund; submitted through IUCN-ISG	**(US$30,000.00)**
International Iguana Foundation	**(US$20,000.00)**
Environmental Foundation of Jamaica	**(J$200,000.00**)
Chelonian Research Foundation Linnaeus Fund with D. Calder	**(US$1,800.00)**
Anonymous Donor; submitted through the International Iguana Foundation with R. Hudson.	**(US$15,000.00)**

Income from Self-Financed Programmes

Programmes	Income	Expenditure
MSc. PPP	Ja$1,100,000.00	Ja$ 642,370.00
Summer school	Ja$ 6,862,982.00	
Rental and Lab Manuals	Ja$ 1,657,577.50	
Consultancy	Ja$ 1,002,900.00	
Other Grants & Donations	Ja$ 491,777.50	

PUBLIC SERVICE

Dr Karl Aiken

- Member, Board of Directors, Caribbean Maritime Institute, (Chairman, Academic Sub-Committee)
- Member, CITES Scientific Authority, NEPA
- Member, Fisheries Advisory Board, Ministry of Agriculture & Fisheries

Dr. Noureddine Benkeblia

- Member, Editorial Board of several International Journals

- Consultant expert, UNPD (United Nation Programme of Development, Switzerland
- Consultant, Scientific Advisory Board (USA)

Dr. Jane Cohen

- Member, CITES Scientific Authority of Jamaica
- Member, Alien Invasive Species Working Group of Jamaica
- Member, Jamaican Society for Agricultural Sciences
- Member, Natural History Society of Jamaica

Dr. Eric Garraway

- Member, Advisory Board of the Natural History Division, Institute of Jamaica.2000-2006.
- Advisor/ Point-person, Vincentian Student Association.

Dr. Kurt McLaren

- Member, The Blue and John Crow Mountains National Park Scientific and Technical Advisory Committee

Dr. Judith Mendes

- Institutional Member, Association of Marine Laboratories of the Caribbean
- Member, UNESCO Science Committee – Barbados
- Member, CAS (Jamaica Chapter).

Prof. Ralph Robinson

- Member, Board of Director Jamaica Agricultural Development Foundation
- Member, National *Ad hoc* Committee to Develop Guidelines for the Aquaculture Industry in Jamaica
- Member, National Shrimp Aquaculture Policy Sub-Committee
- Member, Bioethics Society of the English-Speaking Caribbean
- Scientific Member, National Bioethics Committee of Jamaica

Dr. Paula Tennant

- Staff Representative, National Environment & Planning Agency's Biodiversity Committee

Dr. Kisan Vaidya

- Member, Gene Bank Committee, Jamaica.
- Member, Technical Committee, Jamaica Agricultural Development Foundation (JADF)
- Member, Review Committee (Agriculture related articles) of the *Jamaican Journal of Science and Technology*

Dr. Dale Webber

- Chairman and NGO Member, Board of Directors, Environmental Foundation of Jamaica.
- Council Member, Jamaica Institute of Environmental Professionals (JIEP)
- Chairman, Caribbean Examinations Council (CXC) Panel on Cape Environmental Sciences.
- Reviewer, Elsevier Science Publishing (Environmental Science and Policy)
- Member, National Council on Ocean and Coastal Zone Management (NCOCZM)

Dr. Mona Webber

- Member, National Environmental Education Committee.
- Member, Steering Committee for Sea Turtle Recovery Network,
- Member, Association of Marine Laboratories of the Caribbean.
- Member, Caribbean Academy of Sciences, Jamaican Chapter.
- Member, National RAMSAR committee (NEPA).
- Member, UNESCO National Advisory Committee for Science and Technology
- Member, CITES (Committee for International Trade of Endangered Species).

Dr. Byron Wilson

- Member, Board of Directors, Windsor Research Centre
- Member, Working Group on Invasive Species, (NEPA)
- Invited Member, IUCN SSC Iguana Specialist Group
- Invited Member, IUCN SSC Amphibian Specialist Group

Marcia Creary

- Member, Steering Committee, Caribbean Coastal Marine Productivity programme
- Council Member, Jamaica Institute of Environmental Professionals
- Member, International Society for Reef Studies
- Member, Caribbean Academy of Sciences
- CMS Representative, National Council for Ocean and Coastal Zone Management

Peter Gayle

- Member, Diving sub-group of the working group on Fisheries Management and related matters of the National Council on Oceans and Coastal Zone Management.

Loureene Jones

- Member, Jamaica Blue Flag Jury

Camillo Trench

- Life Sciences/CMS representative of the National RAMSAR Committee (NEPA).
- Member, Communication, Education and Public Awareness (CEPA) sub-committee of National RAMSAR Committee.

CATEGORIES OF STUDENTS

Undergraduate numbers:

Preliminary (Year 0)	–	133
Introductory (Level I)	–	529
Advanced (Level II)	–	159
Advanced (Level III)	–	97

Class of Degrees 2008/2009 Graduates

I	5
II i	15
II ii	31
Pass	11
Total	**62**

Types of Degrees 2008/2009 Graduates

Botany Major	1
Zoology Major	2
Biology with Education	1
Marine Biology Major	2
Experimental Biology Double Major	9
Environmental Biology Double Major	19
Zoology/Botany Major	1
Zoology/Biochemistry Major	5
Botany/Biochemistry Major	4
Botany/Biotechnology Major	4
Zoology/Biotechnology Major	1
Zoology/Molecular Biology Major	1
Botany Minor/Molecular Biology Major	1
Zoology Minor/Biotechnology Major/ Food Processing Minor	1
Botany Minor/Chemistry Major	1
Botany Minor/Marine Biology Major	1
Chemistry/Zoology Major	1
Physics/Zoology Major	1
Zoology/Geology Major	1
Zoology Major/Computer Science Minor	1
Zoology Major/Psychology Minor	1
Zoology Minor/Computer Science Major	2
Zoology Major/Electronics Major	1
Total	**62**

Prizes

The following students were formally recognized for quality academic performance.

Preliminary Biology Prize:	Ms. Kamilah Gallow
Introductory Biology Prize:	Mr. Michael Bennett
	Ms. Deidre-Ann Morgan
S. Potluri book award:	Ms. Taneesha Green
D.P. Devi-Prasad book award:	Ms. Staci Lee Peart
Level II Zoology Prize:	Ms. Taneesha Green
L.B. Coke Plant Physiology Prize:	Ms. Keisha McAlpine
Avinash Potluri Prize:	Ms. Deidre-Ann Morgan
Vincent Hugh Wilson McKie Prize:	Ms. Wendy Ann Barton

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.

DEPARTMENT OF PHYSICS

Dr. Joseph Skobla, MSc, PhD, *TU Braitislava/U of Toronto,*
– Head of Department

HIGHLIGHTS

The Department is in the midst of transformation occasioned by dwindling student enrollment a few years back and an increasing call for science relevance. At the heart of the transformation process has been curriculum reform, and the past year was notable for the time devoted to discussion and review of the Department's offerings. The result has been a three year plan, drafted for implementation beginning 2009/10, which will see modification to existing course structures, redefinition of existing majors and minors, a revamping of the Electronics programme, the reintroduction of a Materials Science major and the introduction of a new major in Medical Physics. To meet the implementation target, a new look first year programme was proposed and the necessary board and committee permissions acquired for it to be launched in September. Additionally, the Department proposed and acquired approval to launch a degree programme in Electronics Engineering – the first UWI Engineering programme to be offered outside of the St. Augustine Campus. The Engineering Faculty of St. Augustine will partner with the Department to roll out the first year of the programme in September 2009.

Staffing continues to be a challenge for the Department. No posts were filled even though there were 5 vacancies. The impact of this was most notable on the Electronics programme. This was relieved somewhat with the return of Dr. Leary Myers from his secondment to the government of Jamaica. Notwithstanding, teaching standards remained high (see ensuing section), and the vacancies provided the opportunities to (i) identify and evaluate potential staff for nurturing amongst PhD students who assisted in content delivery, and (ii) rationalize how the open posts will be filled in the coming years in

conjunction with the redrafted teaching focus and new programmes. Steps are underway to permanently fill two of the posts for the 2009/10 academic year.

The physical infrastructure and teaching and research capabilities were enhanced during the year with the opening of the Physics Virtual Laboratory. The Laboratory houses state of the art software, hardware and teaching technology which has already begun to transform how some areas of the subject are being taught. The Laboratory was funded through Departmental sources along with grants from the University and the Government of Jamaica.

The Department hosted a public lecture by Prof. Mercedes Richards - Professor of Astronomy and Astrophysics at the Pennsylvania State University and the recipient of the Institute of Jamaica's Gold Musgrave Medal for Science (2008). Professor Richards is a UWI Mona special physics graduate of 1977. The Department also hosted collaborators from the University of the Antilles and Guyane, Pointe-B-Pitre, Guadeloupe.

Finally, the profile of the Department benefited greatly from the continued achievements of its staff members. Professor A. Anthony Chen was given the nation's third highest honour – the Order of Merit for his contribution to climatology – and was honoured at the commemoration exercises of the Mona Campus. He was also conferred with the title of Professor Emeritus. Dr. Michael Ponnambalam was singled out for his excellence in teaching, winning both the UWI/Guardian Life Premium Teaching Award (2008) and the Vice Chancellor's Award for Excellence in teaching (2009). Mr. Samuel Daniel and Dr. Taylor were given Teaching Awards at the Faculty of Pure and Applied Sciences annual awards ceremony. Mr. Daniel topped the Faculty in terms of student assessment scores. Dr. Stephenson, Dr. Taylor and graduate students Jayaka Campbell and Felicia Whyte received the award for Best Publication in the Faculty of Pure and Applied Sciences at the annual Research Day awards. Dr. Taylor received the Third World Academy of Sciences (TWAS)/Caribbean Academy of Sciences (CAS) Young Scientist Award at the 16th General Assembly of CAS (2008). Prof. Chen and Dr. Michael Taylor were featured on the Mona Campus' calendar for 2009.

Undergraduate Teaching

A high standard of teaching and a student centered approach contributed to high student assessment scores received by staff members. No staff member received less than 3.6 and of 41 total assessments 37 exceeded 4.0. One staff member, Mr. Ricardo Paharsingh, received a score of 5.0. The Department average for lecturers was 4.4 and for courses was 3.9. With respect to student numbers, a 30% increase in enrolment at the Introductory level necessitated an increase in the number of Laboratory sessions offered and resulted in increased demand on equipment and facilities.

Graduate Programmes

No new MPhil postgraduate student entered the Department in 2008/09 due to the stringent application of admission rules. At the same time, two students were awarded MPhil degrees. There were consequently very few full time postgraduate students in the Department which negatively impacted research output. Efforts are being made to recruit new MPhil students for the upcoming academic year. The MSc in Digital Technology continued with a new batch of 8 students. 5 completed the requirements for graduation.

Research

The 12 members of staff produced 15 conference papers, 11 refereed publications and 1 book chapter. This gives an output of less than 1.0, which, though not ideal, is an improvement on previous years. A target of 1.5 is set for the new academic year. A new renewable energy research group was formed and has been helpful in identifying priority areas for research and teaching in this field. Two projects from the group have been shortlisted in the Global Energy Innovation Competition. New grants totaled in excess of 7 million dollars (see section below).

Outreach

Approximately 900 high school students from 24 high schools participated in the annual CAPE Workshop series held in January 2009. Two CAPE Modules (Oscillations and Waves and Operational Amplifiers) were taught by members of staff and related labs demonstrated by students. The demand for these workshops continues to be high and schools have to be turned away. During the year, the

Department hosted Iona High, Queens High, Wolmers Girls, (CSEC and CAPE demonstrations and labs), Glowell Prep and Hope Valley Experimental (Physics is Fun demonstrations). For the first time in recent years the Department also ventured out to Unity Primary School where 100 students participated in hands on demonstrations.

PAPERS PRESENTED

- **Batchelor, TWK, AMA Amarakoon, MA Taylor, TS Stephenson**, PD Brown. Effect of precipitation and temperature on Leptospirosis in the Caribbean. 4th Biennial Conference of the JIEP. Kingston, Jamaica. May 26-27, 2009.
- **Batchelor, T. W., D. Amarakoon, M. A. Taylor** and **T. S. Stephenson,** 2009: Investigating the Link Between Climate and Leptospirosis in the Caribbean Using Wavelet Analysis, Eos Trans. AGU, 90(22), Jt. Assem. Suppl., Abstract B73B-01.
- **Campbell, J** and **M. A. Taylor** 2009: ICT in Climate Change Research. 1st Caribbean Research Conference on Information and Communication Technology. Mona Visitors' Lodge and Conference Centre. March 16-17, 2009
- **McNamarah, C,** 2008. "An evaluation of the solar thermal electricity potential in Jamaica", 22nd Annual Science and Technology Conference, Kingston, Jamaica, Nov 18-20, 2008
- **Ponnambalam, MJ,** 2009: The Interface between Physics and Psychology 10th Inter American Conference on Physics Education, Medellin, Colombia, July 6-10, 2009.
- **Ponnambalam, MJ,** 2009: Calculation of the Mass of □ Particle. 10th Inter American Conference on Physics Education, Medellin, Colombia, July 6-10, 2009.
- **Ponnambalam, MJ,** 2009: Calculation Has Science Teaching Lost Its Soul? Meeting of the American Association of Physics Teachers, Ann Arbor, Michigan, USA, July 25-29, 2009.
- **Stephenson, T., M. A. Taylor, A. A. Chen, J. Campbell** and **R. Watson,** 2009: The Climate Studies Group Mona: Exploring Caribbean Climate Science. Christian Aid Regional Climate Change Forum, Courtleigh Hotel, March 19-21, 2009.

- **Taylor, M. A.** 2009: Climate Change Modeling in Jamaica. 2nd Caribbean Community Climate Change Conference, St. Lucia, March 23-24, 2009
- **Taylor, M. A**. 2009: The use of climate models for the projections of future climate scenarios in the Caribbean: Experience of the Climate Studies Group Mona. 2nd Caribbean Community Climate Change Conference, St. Lucia, March 23-24, 2009
- **Taylor, M. A.** 2008: We know enough to at least start. CAS 16th General Meeting. Grenada October 10-13 2008.
- **Taylor, M.A.** 2009: Climate Change – the Science. 4th Biennial Conference of the JIEP. Kingston, Jamaica. May 26-27, 2009.
- **Taylor, M. A., T. S. Stephenson, A. A. Chen** and **T. Batchelor**, 2009: Capacity and Need for Providing Climate Change Scenarios for Small Islands, Eos Trans. AGU, 90(22), Jt. Assem. Suppl., Abstract GC22A-05.
- Campbell, G. and **T. S. Stephenson,** 2009: National Adaptation Strategy for Water in Jamaica, St. Lucia, March 23-24, 2009.
- **Voutchkov, M,** 2008: "Medical Physics of Body Composition: Case studies in Jamaica" ICTP, Italy, Sept. 2008.

PUBLICATIONS

Book Chapters

* **Anthony Chen, Michael Taylor,** David Farrell, Abel Centella and Leslie Walling, 2008: Caribbean climate scenarios for the Caribbean: Limitations and needs for biodiversity studies. In Climate Change and Biodiversity in the Americas. Edited by A. Fenech et al. Environment Canada. Toronto, Ontario, Canada. 366 p.

Peer Reviewed Papers

* **Andrade C., Clarke L., Skobla J.,** A novel approach to integrated GPS/INS tracking, Proceedings IEEE Aerospace Conference, Big Sky, MT , March 7-14, 2009.

* **Clarke L.A., Skobla J.,** 2009: Benefits Derived from Restructuring the Practical Component of an Introductory Course in Electronic Communication Systems, Proceedings IEEE International Conference on Microelectronic Systems Education , San Francisco, CA , July 25-27, 2009.

* Ngalamou, L., **Leary Myers,** Christopher Donaldson, Petri Nets and Fuzzy Sets in Hybrid Control Synthesis: The Discrete-event Aspect, WSEAS Trans on System and Control, Issue 2, Volume 4, February 2009, pp. 98-117, ISSN: 1991-8763.

* Ngalamou, L., and **L. Myers,** A Software Approach for Automatic Selection of Programmable Logic Controllers, *South African Computing Journal,* Volume 41, December 2008, ISSN: 10157999.

* Ngalamou, L., and L. Myers, Digital SPWM Synthesis for the Design of Single-Phase Inverters, *International Journal of Elecrtonics,* Vol. 95, No. 5, May 2008, pp 489-503.

* Ngalamou, L., and **L. Myers,** Modelling PLC Charcateristics for Resource Allocation, *International Journal of Computer Applications in Technology,* Inderscience, Vol. 31, Nos. 3/4, 2008 pp. 263-274.

* Nriagu, J., Mazen Boughanen, Aaron Linder, Andrea Howe, Charles Grant, Robin Rattray, **Mitko Vutchkov** and Gerald Lalor, 2009. Levels of As, Cd, Pb, Cu, Se and Zn in bovine kidneys and livers in Jamaica, *Ecotoxicology and Environmental Safety,* Volume 72, Issue 2, February 2009, Pages 564-571

* **Paharsingh R., Skobla J.,**(2009), A Novel Approach to Teaching Microprocessor Design Using FPGA and Hierarchical Structure, Proceedings IEEE International Conference on Microelectronic Systems Education , San Francisco, CA , July 25-27, 2009.

* **Stephenson, T., A. A. Chen** and **M. A. Taylor** (2008), The Climate Studies Group Mona, *Caribbean Quarterly*, 54, 85-88.

* **Stephenson, T.,** C. Goodess, M. Haylock, **A. Chen** and **M. A. Taylor** (2008), Detecting inhomogeneities in Caribbean and adjacent Caribbean temperature data using sea surface temperatures, *Journal of Geophysical Research – Atmospheres,* DOI: 10.1029/2007JD009127.

* Spence, J. M and **M. A. Taylor**, 2008: Jamaica, in State of the Climate in 2007. Levinson, D.H., and J.H. Lawrimore eds., *Bulletin of the American Meteorological Society,* 89, S107-S109.

CATEGORIES OF STUDENTS

Total undergraduate student enrolment in departmental courses.

	Semester 1	**Semester 2**	**Year Totals**
Preliminary	87	81	168
Introductory	223	141	364
Year II	158	150	308
Year III	87	108	195
Totals	**555**	**480**	**1035**

MPhil	10 students (F/T & P/T)
PhD	3 students
MSc	30 students (all years)

INCOME GENERATION

The MSc in Digital Technology programme generated 3.5 million in fees and summer school netted 1.1 million.

Dr. Skobla and Dr. Voutchkov received a grant award for J$5.3M from the Government of Jamaica Cabinet Office, Public Sector Modernisation Division for "Strengthening Medical Physics through Virtual Education and Training". Laboratory and research equipment were purchased and installed for the new academic year.

Dr. Skobla and Dr. Voutchkov continued work on the IAEA Project JAM0004 "Developing National Capacities for the Application of Nuclear Science in Jamaica" with the scheduled activities for 2009 (sub-total of US$54,700).

Dr. Skobla and Dr. Voutchkov participated in the Inter-regional Research Project "Measurement of the Atmospheric Pollutants – volatile organic compound, particles, Sahara dust and their effects on health" between the University of the Antilles and Guyane, University of the West Indies, Mona and St. Augustine and National Institute of Meteorology, Cuba. Currently the air sampling equipment supplied by the project is used to measure Saharan dust levels in Jamaica.

Dr. Voutchkov, Mr. Chad Andrade and Dr. Skobla received a Research Fellowship grant for development of an "In-vivo X-Ray Fluorescence Technique for Measurement and Diagnosis of Heavy Metal Poisoning with GPS capability". The amount of the grant is not yet available.

Dr. Voutchkov and Mr. Victor Douse received a UWI New Initiative Grant for J$1.5Mto perform research on "Novel Utilization of Red Mud for Anticorrosive Protection and Heavy Metal Removal from Waste Water in Jamaica".

Dr. Mitko Voutchkov participated as a team member in the IAEA RLA6061 Regional Latin American project entitled "Training and Updating Knowledge in Medical Physics (ARCAL CVII) including 22 countries. The overall budget for the project is US$708,330 and the amount for each participant is not yet confirmed.

Dr. McNamarah and collaborators received UWI New Initiative Grant for J$1 million for the project *The Effectiveness of Using Fixed Wide Angle Collectors in Solar Thermal Electricity Power Plants* (Dr. Claude McNamarah, PI).

Dr. Taylor, Dr. Stephenson and Prof. Chen received US$ 10,000 for the project *Vulnerability and Adaptationto Climate Change: Workshop for the Government of St. Lucia.*

PRIZES

Undergraduate prizes were awarded to:

UWI Academic Bursary:	–	Tricia Evans
Professor John Lodenquai Prize for Introductory Physics:	–	Ralphston Johnson
Level II Departmental Prize:	–	Tricia Evans
Francis Haddon Bowen Bursary:	–	Natalie McLean
Michael Tharmanahthan Ponnambalam Bursary:	–	Javian Malcolm

PUBLIC SERVICE

Academic staff continue to give sterling service to the University and society at large. Most notable are contributions as external examiners, reviewers for international journals and on several public sector boards and committees.