

DEPARTMENT OF PHYSICS

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– Head of Department

The Department has completed year 3 of its 5 year Strategic Plan. The strategy is premised on a focus on Pure Physics and five Applied Physics areas - Electronics , Alternative Energy, Environmental Physics, Medical Physics, and Materials Science. Within this context , the year was particularly notable for the strides made in Curriculum Reform and Teaching, Research and Public Service and Outreach.



Curriculum Reform and Teaching: The second year of the BSc in Electronics Engineering was completed. At its core is a revised 3-credit Electronics Programme which also serves the Department's major. During the year, the Department sought and received approval for the Final Year of the Engineering programme, as well as new Preliminary and Introductory programmes consisting of six 3-credit courses for each year. The Department also proposed a new structure for the Advanced Physics and Applied Physics Programmes premised on (i) five thematic areas, (ii) a common physics core in each major, (iii) a simplification of student choices, (iv) 3-credit courses, (v) new laboratory courses, and (vi) an expanded credit requirement for majors and minors. The upcoming Year will see the Department obtaining appropriate permissions for the newly structured programme.

Student satisfaction with teaching remains high with 41 of 45 Student Assessments of Lecturers being above 4. Four Lecturers (Professor Anthony Chen, Mr. Victor Douse, Mr. Samuel Daniel and Mr. Ricardo Paharsingh) were awarded for Excellence in Teaching at the Annual Faculty Ceremony. At the end of the year Full Time Members of Staff numbered six. Four positions have been advertised and it is hoped that at least 2 will be filled for the start of the 2011/12 Academic Year.

Six students will graduate with First Class Honours, all of whom were 3 or 4 time members of the Physics Honours Society during the advanced part of their programme. The Society is serving as motivation for students to do well and orienting the best Undergraduate Students toward research through a 4 week Summer Research Internship offered by the Department. Two Physics Graduates (Javian Malcolm and Alyssa Morgan) were honoured for their outstanding academic performance at the Prime Minister's Youth Awards.

Research: Research in the Department centred on the five thematic areas. The Climate Studies Group continues to be a leader in the science of Caribbean Climate, while newer Research Groups in Alternative Energy and Medical Physics are gradually establishing themselves. Expected new hires in the upcoming year should enhance the work of the Department's Research Groups. New externally funded Research Grants (including in kind) totalled in excess of J\$15 Million Dollars and included the funding of a Research Fellowship position, and an Electronics Technology Innovation / Development Project valued in excess of J\$2 million. The latter Project emerged from an Undergraduate Electronics Project which was conceived to investigate fish kills in Black River, St. Elizabeth. A strategy to train and utilise both internal and Faculty funded personnel in securing grants has significantly increased the number of grant proposals being generated and submitted from the Department.

The Department produced 11 Peer Reviewed Publications representing 1.4 per Full-Time Member of Staff which is an increase over last year but still below the target of 2. Staff members and Graduate Students presented at nine Conferences, while 5 Graduate Students (Jayaka Campbell, Dale Rankine, Natalie McLean, Stephen Silvera, and Maurice Miller) were selected from competitive calls and provided with full funding to attend various International Training Workshops in their respective fields of study. Mr. Jayaka Campbell was also chosen as a 'Future Climate Change Scientist' and rewarded with an overseas trip to join other Young Scientists to provide recommendations for the Fifth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC). Drs. Stephenson and Taylor and Graduate Students Jayaka Campbell and Rhodene Watson received a best Publication Award at the Annual Research Day Ceremony.

After taking in no Graduate Research Students last year, 5 Students began Research Degrees bringing the Graduate complement to 16. Two students (Dale Rankine and Roxann Stennett-Brown) received UWI Postgraduate Scholarships. Four students were awarded MPhil Degrees during the year. A cohort of 8 started the MSc in Digital Technology Programme, while 5 completed the Degree. A decision has been taken to suspend new intake into the programme for one year and to use the period to revise the course offering. A new Msc programme in Medical Physics was proposed and approved and is to take in its first cohort in 2012.

Outreach and Public Service: Approximately 1000 CAPE students from 27 High Schools participated in the Department's Annual CAPE Workshops, one day of which was held at the Western Jamaica Campus. Another 500 CSEC students from 21 High Schools participated in the 5th Form Field Trips hosted by the Department which exposed the students to interactive demonstrations, computer simulations and experiments related to their syllabus. A further 750 students from 17 Primary Schools participated in the "Science Is Fun" Field Trips hosted by the Department over one week. The year ended with planning for a Workshop for Physics Teachers entitled, "Good Practice in Physics Teaching", which was conceptualised by the Department and is being conducted in collaboration with the Ministry of Education, CXC and the NCB Foundation. The Department credits a discernible increase in the number of advanced physics students to efforts such as these.

Other Outreach Activities included the launch of the Galileoscope Project in conjunction with the Astronomical Association of Jamaica and the Ministry of Education. Under the Project 400 telescopes will be distributed to Primary and Secondary Schools. The Climate Studies Group, Mona, conducted Public Education Workshop, in the communities of Bunker's Hill, Trelwany and Woodford, St. Andrew.

The Mona Physics Alumni hosted a series of Physics Career talks for Undergraduate Students.

Efforts were also made to engage the public by positioning the Department as a centre of thought, discussion or training in select thematic areas. The Department hosted a seven part Public Lecture Series

entitled, “Climate Talks”, which saw partnerships with the Departments of Geography and Geology and Chemistry and the Public Affairs Section of the United States Embassy. There was also a three week Alternative Energy Workshop in partnership with Wigton Wind Farm, a One Day Workshop on Ballistics and Crime Solving in partnership with the Jamaica Constabulary Force (Forensics Laboratory), and a One Day Workshop on XRF and Spectroscopy technologies in conjunction with the International Atomic Energy Agency and the Department of History and Archaeology.

Members of Staff also served in various capacities on University, National and International Boards and Committees, and provided services to and on behalf of the University.

Milestones: Dr. Mitko Voutchkov, Senior Lecturer in the Department of Physics was promoted to the rank of Professor. Dr. Paul Aiken was promoted to Senior Member of the IEEE. Mr. Jayaka Campbell was appointed as a Junior Research Fellow. Dr. Michael Taylor was appointed to the International Science Panel of VAMOS/CLIVAR for a three year term. VAMOS/CLIVAR examines variability of the American Monsoon System and climate variability in the Intra-American Seas. Dr. Joseph Skobla (former Head of Department), Mrs. Jacqueline Lodenquai (Senior Laboratory Attendant) and Mr. Colman McLeish (Senior Laboratory Technologist) retired. Dr. Claude McNamarah left to pursue other opportunities. Professor Emilia Miliieva, Medical University, Plovdiv, Bulgaria also joined the staff as a Research Fellow in Medical Physics for the 2010/11 Academic Year.

Departmental Statistics

Total Student Registrations.

(Brackets indicate previous year totals. Years II and III include overlaps)

	Semester 1	Semester 2	Year Totals
Preliminary	73 (87)	53 (64)	126 (151)
Intro Physics	247 (207)	177 (145)	424 (352)
Intro Engineering	23 (17)	–	23 (17)
Intro Electronics	–	70 (46)	70 (46)
Year II	240 (172)	201 (143)	441 (315)

Year III	141 (108)	151 (162)	292 (270)
Totals	701 (591)	652 (560)	1353 (1151)

Postgraduate Student Enrolment

MPhil 13 students (F/T and P/T), PhD 3 students, MSc 16 students (all years).

MPhils awarded: **Chad Andrade, Jayaka Campbell, Cherri-Ann Scarlett, Rhodene Watson and Tatrice Bachelor.**

PAPERS PRESENTED

- **A. A. Chen:** Response to a Changing Climate: A Clearer and Cleaner Vision. UWI-COMSEC Conference, Kingston, Jamaica, February 18-19, 2011.
- **A. A. Chen:** Northern Caribbean Countries in a Changing Climate: Adaptation and Mitigation Opportunities, Northern Caribbean Conference on Economic Cooperation. Grand Cayman, December 2010.
- **A. Coy:** Computer Assisted Language Learning Aids, Biennial Conference on Education, June 15-17, 2011, Ocho Rios, Jamaica.
- **T. Kerr and L. Myers:** Fire Measurements derived from Microscopic Analysis of the Concrete Wall Boundaries in a Fire Compartment, Forensic Science Conference, Kingston Jamaica, January 2010.
- **R. Stennett-Brown, D. Amarakoon:** A Study of Climate Variability and its Impact on Dengue Fever and Respiratory Illnesses. The Caribbean Academy of Sciences 17th General Meeting and Biennial Conference, Antigua, November 12-14, 2010.
- **M. A. Taylor:** The Caribbean Modelling Initiative. Invited Presentation. 14th Session of the VAMOS panel meeting, Miami, Florida, March 25-26, 2011.

- **M. A. Taylor:** The Realities of Climate Change. Caribbean Agriculture Week Conference. Grenada, October 17-18, 2010.

PUBLICATIONS

Articles

- * **C. Andrade** and **P. Aiken**, 2010: The Era of Digital Technology. *Carib Xplorer Magazine*, Vol. 1, Issue 3.
- * **C. McNamarah**, **A. Dunkley**, and **P. Aiken**, 2010: Harnessing the Energy of the Sun - Part 1. *Carib Xplorer*, Vol. 1, Issue 3.

Peer Reviewed Papers

- * **Taylor, M. A.**, T. S. Stephenson, A. Owino, A. A. Chenand J. D. Campbell, 2011: Tropical Gradient Influences on Caribbean Rainfall. *J. Geophys. Res.* doi:10.1029/2010JD015580
- * L. Ngalamou and **L. Myers**, 2011: An Exploratory Method for Effective Deployment of Programmable Logic Controllers (PLCs). *WSEAS Transactions on Systems and Control*, Issue 1, vol. 6.
- * García, G., R. P. Suárez, B. L. Pedroso V. C. Cancino, D. B. Rouco, A. L. Lee, V. G. Velazco, T. S. Stephenson, **M. A. Taylor**, J. M. Spence, and S. Rossi, 2011: [The Caribbean] Regional Climates [in State of the Climate in 2010]. *Bull. Amer. Meteor. Soc.*, 92 (6), S161-S163.
- * L. Ngalamou and **L. Myers**, 2010: Combining Software Methods For the Effective Deployment of Programmable Logic Controllers (PLCs). *International Journal of Computer Science and Network Security*, Vol. 10 No.12 pp 134-146.
- * L. Ngalamou, M. George, and **L. Myers**, 2010: Hardware Implementation of the PCM Codec for VoIP Telephony. *International Journal of Engineering Science and Technology*, Vol. 2, Issue 10, 5052-5062.

- * L. Ngalamou and **L. Myers**, 2010: A PLC Database – A Selection Engine for the Effective Deployment of PLCs. *International Journal of Engineering Science and Technology*, Vol. 2, Issue 10, 5058-5068.
- * L. Ngalamou and **L. Myers**, 2010: A Software Approach for the Design of a Virtual Plant Generator. *International Journal of Computer Science and Network Security*, Vol.10, No.9, 48-56.
- * **M. Ponnambalam**, 2011: Effect of Damping on the Period of a Pendulum. *Bulletin of the Indian Association of Physics Teachers*, pp 4-6.
- * **M. Voutchkov**, E. Milieva, 2010: Development of in vivo bone lead measurement for assessment of long-term lead exposure. *West Indian Medical Journal*, Vol.59: (Suppl. 1-53), p.33.
- * E. Milieva, **M. Voutchkov**, 2010: Interaction of vanadium, chromium and zinc in dietary supplements for patients with diabetes mellitus; *West Indian Medical Journal*, Vol.59: (Suppl. 1-53), p.36.
- * F. Jacobs, M. Gossell-Williams, **M. Voutchkov**, 2010: Screening of dietary supplements in Jamaica using handheld x-ray fluorescence analyzer. *West Indian Medical Journal*, Vol.59: (Suppl. 1-53), p.40.

INCOME GENERATION

The MSc in Digital Technology Programme generated J\$2.8 million in fees and Summer School netted J\$1.2 million.

D. Rankine: Agricultural Adaptation to Climate Change : Assessing the Impact of Climate Change induced drought and CO₂ fertilization on sweet potato yields in Jamaica and the Wider Caribbean. US\$3,400. UWI Research and Publication.

M. Miller: Network of gamma Ray Detectors for continuous monitoring and GIS mapping and of Gamma Ray Radiation for Jamaica. US\$1,637.19. UWI Research and Publication.

A. Dunkley: Electrical Characterisation of Dye-sensitized Solar Cells. US\$3,084.81. UWI Research and Publication.

R. Brown-Stennett: Paper at the Caribbean Academy of Sciences General Meeting and Biennial Conference. US\$1,257.41. UWI Research and Publication.

L. Myers and L. Clarke: Pollution Detection in a Moving Body of Water. US\$25,714.70. J. Wray and Nephew.

M. A. Taylor and D. R. Rankine: Incorporating Climate Change into Agricultural Planning – The Case of Sweet Potato. US\$7.5K. UWI and Caribbean Community Climate Change Centre (2011).

M. A. Taylor: Developing Regional Modelling Capacity in the Caribbean (2-year Research Fellowship position) J\$7.6 mil. CARIBSAVE. (2011)

PRIZES

Undergraduate prizes were awarded to:

Professor John Lodenquai Prize for Introductory Physics	– Celeste Sobion
Level II Departmental Prize	– Tamar Richards Ashleigh Chattoo
Francis Haddon Bowen Bursary	– Vincent Taylor
Michael Tharmanahthan Ponnambalam Bursary	– Everard Prout

PUBLIC SERVICE

Paul Aiken

- Chief Judge, National Schools Science Competition
- Vice Chair, IEEE-Jamaica Section
- Engineering Programme Evaluator, Caribbean Accreditation Council for Engineering and Technology (CACET)

Anthony Chen

- Member, Council of the Institute of Jamaica
- Chairman, UNDP-GEF Community Based Adaptation Programme in Jamaica
- Member, GEF- Small Grants Programme

Andre Coy

- Judge, National Schools Science Competition
- Reviewer Journals, IEEE Transactions on Audio, Speech and Language Processing, Computer Speech and Language, Instrumentation Science & Technology

Victor Douse

- Chairman, Cement Technical Committee, Bureau of Standards.
- Technical Assessor, Jamaica National Agency for Accreditation (JANAAC)

Leary Myers

- Member, International Who's Who Historical Society

Tannecia Stephenson

- Member, National Committee for Climate Change Adaptation and Disaster Risk Reduction
- Reviewer Journals, *Climate Research*, *Climate Dynamics*

Michael Taylor

- Member, International Science Panel of VAMOS/CLIVAR
- Member, Steering Committee, Pilot Project on Climate Resilience (Caribbean)

- Member, National Committee of the International Global Biosphere Programme.
- Alternate Chair, UNDP-GEF Community Based Adaptation Programme, Jamaica
- Member, Caribbean Disaster Emergency Management Agency, Educational Sector Sub-Committee.
- External Examiner, Physics, College of Agriculture Science and Education
- Reviewer Journals: *Journal of Geophysical Research*, *International Journal of Climatology*, *Journal of Climate*, *Climate Dynamics*

Mitko Voutchkov

- Member, Heavy Metal Task Force, Ministry of Health
- Life Member, International Society of Environmental Geochemistry and Health.
- Chairman, Technical Advisory Committee “In-situ Methods for Characterization of Contaminated Sites”, International Atomic Energy Agency (IAEA)
- IAEA Technical Co-operation Expert in Nuclear Physics