DEPARTMENT OF PHYSICS

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– Head of Department.

Overview

The Department has completed year 4 of its 5 year strategic plan. Measured against the plan, the past year was noteworthy for continued strides in the areas of Curriculum Reform, Staff Recruitment, Teaching, Research, Public Service and Outreach. The Department continues on a path of renewal and in its quest to find renewed relevance within the University and the national and regional contexts, through high quality physics teaching, research output and public service.

Curriculum Reform and Teaching: The Department launched new preliminary and introductory courses in keeping with the revamped Physics and Applied Physics programme for which it received approval in 2010/11. The new programme is premised on (i) five undergraduate majors in areas of traditional teaching strengths as well as in areas of perceived relevance so as to produce competitive physics graduates (ii) a common physics core and mandatory mathematics courses across all majors (iii) a simplification of student choices (iv) 3-credit courses, (v) new laboratory courses, and (vi) an expanded credit requirement to increase the breadth of material covered in majors and minors. Permission was also sought and acquired for new Year 2 courses to be delivered in 2012/13 in keeping with the phased introduction of the new programme.

Significantly, the first cohort of six graduates completed the BSc in Electronics Engineering, one with First Class Honours. The students are the first UWI trained engineers wholly schooled at the Mona Campus, with oversight from the Faculty of Engineering, St. Augustine. The

successful conceptualisation, development and implementation of the Electronics Engineering programme at Mona has laid the foundation for the continued expansion of the teaching of Engineering on our campus, and has also provided a model for doing so using shared resources. The Department is particularly proud of the role it played in this development.

Student satisfaction with teaching remains high with most student assessments of lecturers being above 4. Three lecturers (Mr. Victor Douse, Mr. Samuel Daniel and Dr. Michael Taylor) were awarded for excellence in teaching at the annual Faculty Ceremony. Through active recruiting, for the first time in a number of years, the full time staff complement increased (as opposed to decreasing) from six to seven. The department welcomed Dr. Jean-Francois Dorville and Dr. Keith Duncan, even as it said goodbye to Dr. Claude McNamarah. Two additional posts were advertised and the selected candidates should join the staff at the beginning of 2012/13. The Department hosted Dr. Derrick Hylton from Spelman College, USA for one semester as a Visiting Associate Professor.

Four students will graduate with First class honours, all of whom were 3 or 4 time members of the Physics Honours Society. The Society continues to serve the purpose of identifying talented students early in their University career and mentoring them through to an Honours degree.

Research: There are several encouraging signs pointing to the re-emergence of a research culture in the Department. Though the Climate Studies Group, Mona (CSGM) continues to lead in all measures of successful research, the newer research groups (Alternative Energy, Medical Physics, and Materials Science) have made significant strides, particularly with the input of the two new staff members. New grants or extensions of existing ones totalled in excess of 15 million dollars. Sources of funding include the UWI (a new initiative grant, and 8 awards to graduate students from the Research and Publications Fund), competitive national and international research calls and consultancies for the Government of Jamaica and the private sector (see listing below). Significantly among the funded projects are a number involving interdisciplinary collaboration including with the Departments of Chemistry (biodiesel production), Life Sciences (climate change and sweet potato production; the impact of climate on biodiversity in the Hellshire

Hills), the department of Geography (hydrological modelling; Caribbean climate and agriculture review) and the Department of Economics (Caribbean climate and agriculture review).

Conference presentations by staff and students also increased significantly and included 9 oral and 4 poster presentations at the 11th Biennial Conference of the Faculty. Undergraduate student Kamau Stewart and the Materials research group shared the best poster prize while postgraduate student Natalie McLean and the Climate Studies Group copped second place. Graduate students Dale Rankine, Natalie McLean, Stacy-Ann Nelson and Victor Douse had short study tours in Barbados and Austria, Barbados, Colombia and Canada respectively where they presented their work. At the University's Annual Research Awards, Dr. Michael Taylor was recognized as the Most Outstanding Researcher in the Faculty of Pure and Applied Sciences for his research on Caribbean Climate Variability and Change, while Professor Mitko Voutchkov received the award for the Research Project Attracting the Most Research Funds in the Faculty of Pure and Applied Sciences for the project "Medical and Health Applications of Nuclear Physics". The department produced 9 publications and a documentary. This was below the target set for the year but there is joint commitment to improve on this in 2012/13.

4 students began research degrees bringing the graduate complement to 19. A cohort of 9 completed the MSc in Digital Technology, bringing to a successful completion the re-organization of that programme. After a one year suspension, a new cohort of 10 has been accepted for the upcoming academic year. The new MSc programme in Medical Physics obtained final approvals and will take in its first cohort of 11 in September 2012.

Outreach and Public Service: The Department's CAPE and CSEC Workshops continue to be popular and oversubscribed. 820 CAPE students from 20 high schools participated in the CAPE Workshops (one day of which was held at the Western Jamaica Campus), while 452 CSEC students from 13 high schools participated in the 5th Form Field Trips hosted by the Department. A further 400 high and tertiary students visited the department throughout the year to conduct laboratory experiments. The Department also targeted the training of physics teachers with a one day seminar on **Problem Solving in Physics** and a two week workshop

entitled **Good Practice in Physics Teaching** hosted in collaboration with the Ministry of Education, CXC and the NCB Foundation.

For the first time, five (5) students from the Department participated in the IEEE Southeast Conference Student Competitions that was held in Orlando Florida from March 15-18, 2012. The students entered the Software, T-Shirt, Website, Paper and Hardware (Robotics) Competitions. Their robot placed a commendable 17th out of 42 University entries.

During the year the Department hosted 5 workshops with external partners (3 with international participants) covering Carbon Markets, Climate Data Rescue, Climate Modelling, Ballistics and Forensics and X–ray and Gamma Spectroscopy Techniques. This was in addition to 17 public lectures. Eight of the lectures were part of the Climate-Energy Nexus monthly lecture Series - a department initiative to increase public discourse on energy and climate change.

Members of staff also continue to serve in various capacities on university, national and international boards and committees, and provide services to and on behalf of the university.

Infrastructure: With assistance from the University the Department was able to refurbish the two-storey administrative block, including upgraded office spaces, seminar room and kitchen, as swell as refurbish and expand two lecture rooms, and significantly enhance the IT infrastructure used by both staff and students.

Milestones: Dr. Paul Aiken was promoted to Associate Dean for Outreach and Development with responsibility for Engineering. Mrs. Rosalene Simmonds was promoted to Senior Administrative Assistant. Dr. Michael Ponnambalam retired. Ms. Darlene Field (Senior Laboratory Technologist) and Mr. Jon-Paul Callen (Laboratory Technologist) left to pursue other opportunities.

Departmental Statistics

Total Student Registrations.

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

	Semester 1	Semester 2	Year Totals
Preliminary	101 (73)	89 (53)	190 (126)
Intro Physics	203 (247)	128 (177)	331 (424)
Intro Engineering	25 (23)	–	25 (23)
Intro Electronics	—-	81 (70)	81 (70)
Year II	259 (240)	213 (201)	472 (441)
Year III	76 (141)	154 (151)	230 (292)
Totals	**664 (701)**	**665 (652)**	**1329 (1353)**

Postgraduate student enrolment

MPhil 13 students (F/T and P/T) PhD 6 students, MSc 9 students (all years)

PUBLICATIONS

Books

* **A. Coy,** Emulating Human Speech Recognition: A Scene Analysis Approach to Improving Robustness in Automatic Speech Recognition, 2011, *Nova Science Publishers, New York.*

Book Chapters

* **A. Coy**, Perceptually Motivated Approach to Achieving Robustness in Automatic Speech Recognition, in A. Stavros, Editor, Advances in Communications and Media Research, Volume 6, 2011, *Nova Science Publishers,* New York. [Invited Chapter]

Journals

* Taylor, M. A., F. S. Whyte, T. S. Stephenson and J. D. Campbell, 2012: Why dry? Investigating the future evolution of the

Caribbean Low Level Jet to explain projected Caribbean drying. *International Journal of Climatology*. DOI: 10.1002/joc.3461.

* Taylor, M. A., T. S. Stephenson, A. Owino, A. A. Chen, and J. D. Campbell , 2011: Tropical gradient influences on Caribbean rainfall, *J. Geophys. Res.*, 116, D00Q08, doi:10.1029/2010JD015580.

* Taylor, M. A., T. Stephenson, A. Trotman, J. Spence, O. Martínez-Sánchez, G. Votaw, I. González-García, R. Pérez-Suárez, B. Lapinel-Pedroso, A. León-Lee, D. Boudet-Rouco, and N. González-Rodríguez, 2012: [Regional Climates] Caribbean [in State of the Climate in 2011]. *Bull. Amer. Meteor. Soc.* 93 (7) S170-S173. IF 6.124

* Mandal, A., M. Voutchkov, 2011: Heavy Metals in Soils around the Cement Factory in Rockfort, Kingston, Jamaica. *International Journal of Geosciences*, Vol. 2 No. 1, 2011, pp. 48-54.

Other

* Climate Studies Group, Mona (CSGM), 2012: State of the Jamaica Climate: Past and Future. Information for Resilience Building. For Pilot Project for Climate Resilience. GOJ. 180 pp.

* Taylor, M. A., K. A. Stephenson, D. R. Rankine, 2011: Climate Variability and Change and Water Availability in the Caribbean. CARDI/CTA Technical Paper. 52 pp.

* Stephenson, T. S., M. A. Taylor and A. A. Chen 2011: Climate Change and Caribbean Science. *Carib Xplorer* Vol. 2, Issue 1 March 2011/March 2012**.**

Non-print

* *Time to Adapt – 3 Jamaican Stories. 2011*. 26 minute documentary chronicling the story of three Jamaican communities and their efforts to adapt to climate change. Produced by the Climate Studies Group, Mona

INCOME GENERATION

The MSc in Digital Technology programme generated 3.6 million in fees and summer school netted 1.2 million.

Other significant funding

- Climate Studies Group, Mona. *Modeling Climate Change in Jamaica for priority sectors.* US$20K. Planning Institute of Jamaica and the IADB.
- Climate Studies Group, Mona. Climate Change, Agriculture and Food Security in the Caribbean Region. US$18K, FAO.
- M. A. Taylor and D. R. Rankine: Further support for Incorporating Climate Change into Agricultural Planning – The Case of Sweet Potato. US$6K. Caribbean Community Climate Change Centre (2011).
- Department of Physics. A Capacity Building Workshop on Data Rescue and Climate Change Indices. US80K. WMO, NOAA, UWI, CCCCC.
- The Alternative Energy Research Group. Monitoring of light intensities of solar fixtures on Highway 2000 and at the Dyke Road Fishing Village. US 26K. TransJamaica Highway Limited and the National Road Operating and Construction Company .
- The Alternative Energy Research Group. Cooperative work on energy. US25K. Grace Kennedy Limited.
- Dale Rankine. In support of presenting a paper at the FAO/IAEA International Symposium on Managing Soils for Food Security and Climate Change Adaptation and Mitigation, in Vienna, Austria. US5K, UWI Research & Publication and IAEA.
- Phylicia Ricketts: Characterization of Essential and Toxic Elements in Animal Tissue. J$168,936.08. UWI Research & Publication.

- Kimberly Stephenson. To present a poster at the Student Conservation Science – New York. J$114,956.00. UWI Research & Publication.
- Tanya Kerr. To present a paper at the International Symposium on Fire Investigation 2012 – Maryland, USA. J$147,901.00. UWI Research & Publication.
- Tanya Kerr. Course registration fee for a Graduate Level course in Applied Fire Dynamics at the University of Maryland. US$2,658.00. UWI Research & Publication.
- Calvert Barclay. Short term research at the International Institute for Carbon –Neutral Energy Research (FCNER), Kyushu University, Japan. J$297,000.00. UWI Research & Publication.
- Stefan Watson. Corpus Collection for Development of an Automated Literacy Tutor. J$250,000.00. UWI Research & Publication.
- Rochelle Walters. Presentation at the World Climate Research Programme (WCRP) Open Science conference. UWI Research & Publication.

PRIZES

Undergraduate prizes were awarded to:

Professor John Lodenquai Prize for Introductory Physics	–	Aston Hamilton
Level II Departmental Prize	–	Leaford Henderson Dayne Robinson
Francis Haddon Bowen Bursary	–	Celeste Sobion
Michael Tharmanahthan Ponnambalam Bursary	–	Jhordanne Jones

PUBLIC SERVICE

Paul Aiken

- Vice Chair, IEEE-Jamaica Section
- Engineering Programme Evaluator, Caribbean Accreditation Council for Engineering and Technology (CACET)

Anthony Chen

- Member, Climate Change Advisory Board, Ministry of Land, Water, Environment and Climate Change
- Member, Council of the Institute of Jamaica
- Chairman, UNDP-GEF Community Based Adaptation Programme in Jamaica
- Member, GEF- Small Grants Programme

Andre Coy

- Reviewer Journals, *IEEE Transactions on Audio, Speech and Language Processing, Computer Speech and Language, Instrumentation Science & Technology*

Keith Duncan

- Managing Editor, *International Journal of IONICS*.

Victor Douse

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

Leary Myers

- Board Chairman, National Water Commission.
- 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, Climate Change Advisory Board, Ministry of Land, Water, Environment and Climate Change

- 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
- External Examiner, Physics, College of Agriculture Science and Education
- Reviewer Journals: *Journal of Geophysical Research, International Journal of Climatology, Journal of Climate, Climate Dynamics, Theoretical and Applied Climatology*.

Mitko Voutchkov

- Member, Jamaica's Energy Council, Ministry of Science Technology, Energy and Mining
- 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