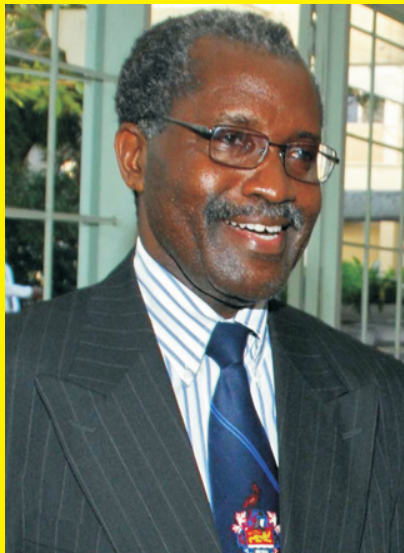


FACULTY OF PURE AND  
APPLIED SCIENCES

MONA

Year ending July 31, 2012



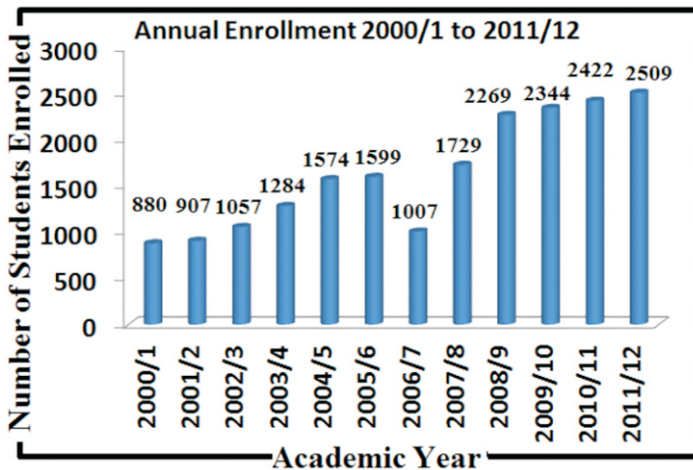
**Professor Ishenkumba Kahwa, BSc, MSc *Dar*,  
PhD *Louisiana State* – Dean**

# Overview

## PREPARATION OF THE DISTINCTIVE UWI GRADUATE – INITIATIVES, NOTABLE ACHIEVEMENTS

### Student Enrolment and Access to Faculty Programmes

The number of students enrolled in our Faculty has steadily grown over the last decade as shown in the figure below and the total enrollment of 2509 was a new record for the Faculty. The intake of 1062 new students in 2011/12 was also a new record for the Faculty of Pure and Applied Sciences and remarkably the highest of any faculty's intake, including that of the Faculty of Social Sciences.



The increase in enrollment broke student population records in nearly every Department and triggered a new wave of coping innovations. Departments (Chemistry and Life Sciences) mounted evening (running up to 9PM) and weekend laboratory sessions, which surprisingly turned out to be very popular, and invested in more equipment and laboratory space to improve the learning and teaching experience. With this experience of more efficient use of time and space, we have the basis for expanding access to the Faculty's programmes of study with minimal limitations from infrastructural resource challenges.

## **INITIATIVES FOR ENHANCING THE LEARNING EXPERIENCE FOR 2010-11**

### **Curriculum Reform**

The Faculty completed an extensive curriculum reform process across all its Departments; most of the Departments implemented the reforms and were using the new level I curricula this year. This was done very carefully to ensure that the respective disciplines had the opportunity to establish standards and benchmarks for their content coverage, instructional time allocations, laboratory skills development and other teaching and learning activities. The curriculum reform has achieved modernization, diversity and flexibility in the Faculty's programme offerings and enhanced the depth of majors and is expected to improve throughput, especially at level 1.

The new curriculum was approved by the Board for Undergraduate Studies (BUS) as: requirements for a major –minimum of 33 credits; Minor –minimum of 15 credits; and minimum for graduation - 93 credits (instead of the current 101). The minimum limit of graduation credit requirements is now consistent with best practices in other UWI faculties and leaves room for use of higher credit requirements for programmes bound by accreditation and other international benchmarks. All courses in the Faculty will henceforth (normally) be of three credits each. It is hoped that these reforms will result in **demand-lead programme offerings** with **robust degree programme customized** to suit diverse student career aspirations and better throughput outcomes.

## NEW PROGRAMME AND COURSES OFFERINGS

**Mathematics:** Students in the Mathematics major Level I were offered the new curriculum and did the new 3-credit courses: MATH1141, MATH1142, MATH1151 and MATH1152. The Department also offered the course MATH 1185, tailored to the needs of Physics and Chemistry students, a statistics course, STAT1001 and a computing mathematical course, COMP1110. Development of level II courses under the new curriculum was completed and approved for offering in 2012/13.

**Life Sciences:** Revision of the final year (Level 3) courses and amendments to the previously approved BSc programmes and majors, reintroduction of the BSc in Experimental Biology and transformation of the Tropical Horticulture programme into a Major were completed. The 3-credit course format facilitated the introduction of new courses i.e. Plant Eco-physiology, Pollution Biology, Sustainable Use of Marine Fishable Resources and Environmental Microbiology. Revision of Biology of Fungi (formerly Mycology) and the Biology of Soil were also completed. Students can now choose from among the following offerings: BSc Programmes in Environmental Biology and Experimental Biology; Single majors in Animal Biology, Applied Plant Sciences, Horticulture, Marine Biology and Terrestrial and Freshwater Biology, with Minors in Conservation Biology, Human Biology and Plant Sciences complement these majors.

**Computing:** The Department added to its offerings a BSc in Information Technology and approval was also given for this programme to be offered at the Western Jamaica Campus in 2012/13.

**Physics:** The Department implemented Level I courses of the new curriculum, including new laboratory and a mandatory mathematics courses. Development and approval of Level II courses was also achieved.

**Geography and Geology:** The Department began its transition to a new 3-credit course system with offerings of eight new Level I courses, four in Geography and four in Geology. All first year courses have been redesigned, with new lecture material, assessment methods and revised practical classes. A suite of new Level II courses in Geography and

Geology were designed and approved by AQuAC, for offering in 2012/13.

## **MECHANISMS FOR ENHANCING LEARNING**

**Innovations in Tutorial and Peer-Led Learning:** Building on the success of interventions put in place previously, reflective learning opportunities such as tutorials given by peers (in Department of Chemistry and Computing) or required by the Department (Life Sciences) continue to be effective opportunities for learning. The Department of Life Sciences has reversed poor performance at Level I from poor pass rates of 52/65% in 2009/10 to up-to 86% for 2011/12. Major improvements in performance at level I where high failure rates have been the norm, followed the implementation of compulsory tutorial attendance regimes with graded weekly quizzes and grading assistance secured from graduate students. The peer-led learning and book loan programmes in the Department of Chemistry as well as the Bridging Mathematics programme in the Department of Mathematics also continued to be helpful in learning.

**International Student exchange, internships and placements:** International exchange activities funded by the Linnaeus-Palme Foundation continued with the University of Gothenburg, Sweden. Visitors from UWI Mona to Gothenburg were: staff - **Drs. Paul Maragh** and **Roy Porter** (March 2012); and students - Mr. Keisean Stevenson (undergraduate) and Janese Henderson (graduate) Semester 2. Visitors from Gothenburg to UWI Mona were **Prof. Johan Boman** and one undergraduate student, Jannie Staffanson. Prof. Boman, an atmospheric physicist, delivered four research seminars and a lecture to undergraduate students taking the course Chemical Analysis II and participated in discussions geared towards launching a collaborative research programme in atmospheric science. This exchange programme is coordinated by **Prof. Ake Nilsson** (Gothenburg) and **Dr. Novelette Sadler-McKnight** (UWI).

The Department of Computing launched its first internship courses (*Internship in Computing*) to Levels II and III students in Semester II of this year. Professional certification courses (Cisco Networking Academy) were

also run with encouraging income generation outcomes. Three visiting Professors: (Kweku-Muata Osei-Bryson of Virginia Commonwealth University, Robert France of Colorado State University and Suresh Sankaranarayanan of the Institut Teknologi Brunei) were appointed to strengthen and diversify computing academic programmes especially at the graduate levels. Professor Osei-Bryson has met with staff who supervise graduate students and the graduate students themselves to assist with capacity building. Professors Sankaranarayanan and France continue to supervise graduate students.

Industry placements for students enrolled in the Industrial Chemistry course also continued.

**Student ‘professional’ societies:** Departments continued to pay special attention to the involvement of students in professional societies and similar opportunities for learning and mentorship. Physics students getting First Class Honours continued to be mostly from among those mentored in the Physics Honour Society. The Geography and Geology Department continued its tradition of involving students in professional and scholarly activities. The Chemical Society (a student organization) was very much involved in preparations and implementation of activities observing the International Year of Chemistry (including production of a magazine). The Actuarial Student Society is involved in grooming students for careers as actuaries with support from senior persons in the profession. The Centre for Biotechnology conducted its first undergraduate symposium to provide inspiration and focus final year students’ attention on biotechnology.

## **IMPROVEMENTS IN GRADUATE STUDIES; NOTABLE ACCOMPLISHMENTS OF GRADUATES**

**New Programmes:** Development of the MSc in Food and Agro-Processing Technology and MSc in Enterprise Risk Management (the later jointly offered with Mona School of Business) programmes were completed and approved for delivery in 2012/13. The MSc in Marine and Terrestrial Ecosystems (MaTE) was taught for the first time as one of the specializations under the Natural Resource Management (NRM) suite of

programmes of study. Development of an MSc programme in Medical Physics was completed and the programme will be offered in 2012/13.

**International Exposure:** Through a New Initiative grant to Dr. Batic, two MPhil students (Mr. Runako Williams and Mr. Dujon Dunn) visited Universidad de los Andes (Bogota, Colombia) three times over the last year to conduct research related to his project Mathematical aspects of quantized space-times. While there they worked with Prof. Marek Nowakowski (Department of Physics) and Prof. Monika Winklmeier (Department of Mathematics) and participated in a workshop entitled Quantum Integrable Systems held at Universidad de los Andes. The Gothenburg University - UWI exchange include on MPhil(Chemistry) student. An alumnus of the Department of Chemistry and emerging technology entrepreneur, Dr. Kamal Abdur-Rashid, now CEO, Kanata Chemical Technologies, Toronto, Canada was appointed Visiting Professor to facilitate collaborative research on industrial materials involving co-supervision of research students.

**Graduate Achievements:** A number of our graduate students received awards or commendations:

Ms. Charah Watson, who has completed her PhD studies, was one of the One Hundred Most Promising Young Chemists in the World chosen to celebrate 2011 as the International Year of Chemistry based on the pest control research that she has done at the Natural Products Institute. She presented on her research at the celebratory symposium held Aug. 14-18, in Sao Paulo, Brazil. She was also recognized for this award at the Annual Faculty of Pure and Applied Sciences Awards and an invited special lecture at the Third World Academy of Sciences – Latin America and Caribbean (TWAS-LOLAC) Symposium in Tobago.

### **IMPROVING RESEARCH/ INNOVATION OUTPUT, NOTABLE ACHIEVEMENTS, DISTINCTIVE RESEARCH OUTPUT**

The faculty continued its focus on internationally competitive research; a total of 98 refereed papers and 11 books/edited works were published for 2011/12. There were also 20 refereed conference presentations and 20 non-refereed contributions. One patent was granted to the Natural

Products Institute/Chemistry collaboration of Dr. Trevor Yee and Prof. Jacobs. The Faculty organized the FPAS 9<sup>th</sup> Biennial Conference under the theme “*Science: Bridge to the Future*” while the Department of Geography and Geology organized a 50<sup>th</sup> anniversary to commemorate 50 years of geology at UWI and the Department of Chemistry organized its 24<sup>th</sup> Mona Symposium on Natural Products and Medicinal Chemistry in January 2012.

## Research/Innovation Output

The 2010/11 publication profile for the Faculty is shown in the Table below. It shows that there was no significant increase in total publications over 2010/11 but the Department of Life Sciences achieved significant increase (to 22) in refereed papers over 2010/11 (from 15).

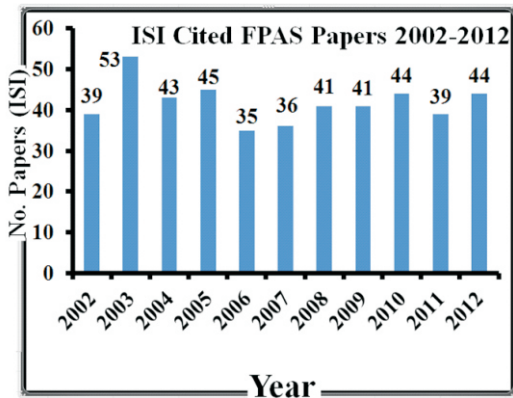
Department/Centre/ Institute/Unit	Refereed Articles/Chapters		Patents		Books and Edited Works	
	2011/12	2010/11	2011/12	2010/11	2011/12	2010/11
Biotechnology	9	11				
Chemistry	19	21				1
Computing	10	8				1
Electron Microscopy	1	2				
Geography/Geology	17	24			3	3
International Centre for Environmental & Nuclear Sci (ICENS)	3					
Life Sciences	22	15			7	9
Mathematics	9	15				2
Natural Products Institute	5	4	1			
Physics	5	11			1	
<b>Total</b>	<b>107</b>	<b>111</b>	<b>1</b>		<b>11</b>	<b>16</b>

## International Competitiveness

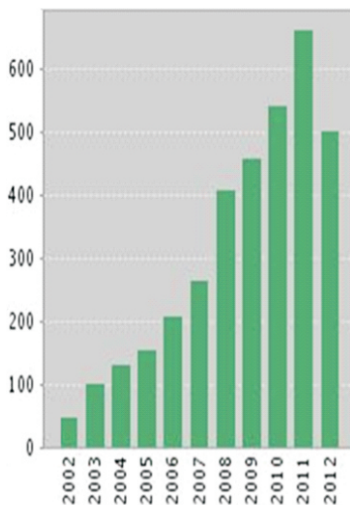
While the number of refereed papers is reasonable the number of papers making it into the highly respected Thomson Reuters ISI data base (Web of Knowledge) continues to be of concern (see figure below). However,



visibility of the Faculty’s research output continues to be healthy as shown by significant citations (see figure below). It is important to grow the number of our publications in international data bases and improve our global visibility for reason discussed in the 2010/11 report.



Citations in Each Year



Growing Citation of publications from UWI’s Faculty of Pure and Applied Sciences researchers in the prestigious ISI Data base for 2002-2012

## Notable Research Achievements

**Prof. Ishenkumba Kahwa** (Chemistry Professor and Dean) was awarded the 2011 CARICOM Science Award in recognition of his outstanding contribution to the field of science nationally and throughout the region. **Prof. Simon Mitchell** (Geology Professor) was awarded the 2011 Gleaner Award for Science and Technology in recognition of his outstanding contribution to Geological Research. **Dr. Daniel Coore**, Senior Lecturer in Computing and co-inventor of the UWI Cardiac Surgery Simulator was honoured at the 2012 Research Days awards for his outstanding contribution to the development of this vital training tool and its promotion, which led to orders and developmental collaborations from 7 major cardiac surgery training schools in the USA. **Drs. Paula Tennant** (Life Sciences), **Byron Wilson** (Life Sciences) and **Henry Ellis** (Chemistry) were promoted to Professorships. For the first time, five (5) students from the Department of Physics 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 17<sup>th</sup> out of 42 University entries.

## Support for Governments, the Regions and international community

The Faculty as a whole has been a reliable source of expert service for the public and private sectors as well as international communities. Matters consulted on include: potential and exploitation of Jamaica's mineral resources, energy options and climate change effects/adaption, threat of invasive butterfly species on the citrus industry, management of heavy metal accumulation in the environment and export food crops, better process control in the food industry, occupational safety and health, provision of coast re-vegetation seedlings from the Port Royal Marine Labs, services of a Hyperbaric (Recompression) Chamber at the Discovery Bay Marine Laboratory for divers across the island, tracking and finding solutions to marine invasive species (especially the Lion Fish), laboratory testing for some national sports programmes and agro-product chemical profiles (e.g. ginger), science and mathematics teacher education,

earthquake activity tracking, ballistic and forensics, plant disease and antiretroviral drug resistance patterns.

The Biotechnology Centre continued its innovative projects employing biotechnology techniques to promote environmentally friendly livelihoods, economically important forest biodiversity and conservation and use of nutritious biochar materials in plant production.

The UWI Cardiac Surgery Simulator continued to be in demand as major Universities and hospitals in the USA as well as the University Hospital of the West Indies continue to get good outcomes in training trials. Many Faculty academics continue to be in demand as editors and referees for international journals (in particularly high demand is Prof. N. Benkeblia), assessment and promotions processes of universities around the globe and chairs of boards.

### **SERVICE TO THE WIDER COMMUNITY, INCLUDING THE OPEN CAMPUS COMMUNITY; NOTABLE ACHIEVEMENTS**

The Mona Institute of Applied Sciences (MIAS) has continued to focus on retooling to provide critical analytical service to the agricultural export sector and other agencies. It is now an integral part of the quality assurance/control mechanism of the Ministry of Agriculture's export division for ginger and other agri-products with delicate flavours/fragrances. MIAS's assistance to the ackee industry, i.e. determination of hypoglycine levels, is also significant. The institute has upgraded its biology and chemistry laboratories to enhance its capacity to compete for businesses. Other, activities run routinely such as consultancy work and outreach activities that promote and enhance UWI's impact continued. The Departments of Physics and Chemistry and the Centre for Biotechnology ran workshops to enhance the understanding of important concepts and the competitiveness of sixth formers for entry into University programmes. The Department of Mathematics again organized a very successful Mathematics Olympiad competition that saw Jamaica again send a team to the regional competition in El Salvador in July 2012 and move up two steps in ranking. This year the Mathematical Olympiad was again sponsored by Sterling Asset Management Limited, University of the West Indies, Mona and several other companies. In 2011, the

department also ran the Junior Mathematical Olympiad, which was sponsored by the University of the West Indies and Insurance Association of Jamaica (IAJ). The Department of Physics ran several public workshops and seminars on energy, climate change, ballistics and forensics; the Department of Chemistry ran a vibrant seminar programme to which the public was invited.

## **ADDRESSING THE FUNDING CONSTRAINTS**

The Faculty's departments/centers/institutes reported income of at least J\$120 million from various sources such as external grants, summer school, teaching programmes and technical services. Like in 2010/11 the Department of Life Sciences has been most successful in securing external grant funding. Details are available in the following individual Departmental Reports, which show that the Faculty is playing its part in covering a shortfall in government funding but there is still room for the Faculty to achieve more. The work of the Resource Mobilization Unit, which is designed to facilitate staff members with developing their research ideas into fundable research projects, is showing great promise. Disbursement of funds from donors resulting from these efforts is largely pending. The Faculty staff now better understands how the unit can help with fund raising and the Coordinator (Dr. Julie-Ann Grant) has entrenched herself into key external funding mechanisms. The contract of the Coordinator has been extended and additional staff (one) approved in principle to enhance the Faculty's resource mobilization effort. We thus believe that the Faculty's contribution to grants from external sources will increase significantly in the coming years.

## **RENAMING THE FACULTY OF SCIENCE AND TECHNOLOGY**

As of August 1, 2012 the Faculty of Pure and Applied Sciences will be renamed 'The Faculty of Science and Technology' to bring focus to its new thrust on production of scientific and technological knowledge and human resources and their innovative application to wealth creation opportunities. This change highlights the successful introduction of engineering programmes and the impending launch of the Mona School of Engineering in 2013.