# FACULTY OF ENGINEERING Mona

# Year ending July 31, 2019



DR. PAUL AIKEN BSc. MPhil. UWI, MSc. PhD Columbia University DEAN

# Dean's Overview

#### WORK OF THE FACULTY

The Faculty of Engineering (FOE) came into being on August 1, 2018, and was officially launched on Wednesday, September 12, 2018. During the 2018–19 academic year, the FOE effected a number of changes to the curricula of its programmes. These modifications became necessary to improve course content and incorporate recommendations from ABET in keeping with the teaching and learning objectives of the Faculty. Some course codes were also changed to eliminate confusion with the UWI, St Augustine courses. *(See appendix).* Students registered in the Computer Systems Engineering (CSE) program were found to be using the CSE to gain access to the Computer Science program in the Faculty of Science and Technology (FST). This has resulted in a significant reduction in numbers for the CSE program, hence the decision was taken to discontinue the program.

The Faculty continues to be constrained by its limited classroom space. The FOE does not own a lecture theatre and as a result we are unable to provide adequate seating for courses with large enrolment numbers. It is therefore our intent to broker discussions with the FST to have a seamless transition, as we seek to gain access and control of Science Lecture Theatres 2 and 3, as well as two small rooms in buildings assigned to FOE that are not being used. These small rooms will be used for small tutorials.

The FOE's intent to create a world class teaching and research facility; forging strong synergies with our industrial and commercial partners is still in focus. The main highlight of the Faculty, during the 2018–19 academic year, was our success in achieving International Accreditation from ABET for our BSc Electronics Engineering programme. The assessment and feedback during the accreditation process provided learning opportunities and information that has set us on a path of continuous improvement, while maintaining high standards in our academic offerings and delivery modalities, as we seek to have all our programs accredited. We have also taken steps to strengthen our Administrative and Support services and now have an Administrative Officer, who will support the work of the Dean and Deputy Deans as

we seek to streamline the structure of the Faculty's operations to align with the Strategic Plan of the University.

#### **Student Number Statistics**

The number of applicants for engineering continues to increase, with the Preliminary Engineering programme having the highest overall enrolment and Civil Engineering registering the highest enrolment of all the degree programmes.

### **Registration Breakdown**

Total New students:	148
Electronics Engineering:	18
Electrical Power Engineering:	8
Civil Engineering:	45
Biomedical Engineering:	10
Preliminary Engineering:	67

*Total number of students enrolled:* 320 students were registered at the beginning of the academic year. A significant number were de-registered as a result of financial blocks.

# Academic Partnerships

• University of Pennsylvania (UPENN): The Faculty of Engineering students are now able to attend lectures via live stream from UPENN each Thursday. UPENN students also visited from May 15 to May 26, 2019 for the exchange programme in keeping with the partnership. The visiting students toured the UWI and UTech campuses. They were also taken on tours of the Kingston Public Hospital (KPH) and UHWI Therapy Clinics, as well as, the Sir John Golding Rehabilitation Centre.

Dr Michelle Johnson of UPENN also visited the Faculty during the academic year to explore the possibility of partnering in the redesign of a Haptic Theradrive and Rehab CARES device at a lower cost. The current cost is US\$2500 and the goal is to reduce it to between US\$1000 and US\$1500.

• University of Florida (UF): The MOU with the University of Florida continued on its intended path. The 2+2 partnership for 8 engineering programmes is expected to have one candidate from the FOE ready for transition in Semester 1, of 2019–20.

• *New Fortress Energy (NFE):* The Faculty continues to benefit from NFE increasing partnerships in STEM outreach and creating sponsorships for teaching of a semester 2 course on LNG Technologies.

# Accreditation

The FOE was successful in its bid to achieve International Accreditation from ABET for our BSc Electronics Engineering program during the 2018–2019 academic year. This followed the ABET site visit and rigorous assessment in 2018. The assessment process was instrumental and provided learning opportunities and information that continues to guide our efforts towards continuous improvement and maintaining high standards in our academic offerings and delivery modalities.

# **Outreach Activities**

- UWI Research Days 2019: The Faculty's presence at the annual Research Day exhibition continued to grow for the 2018–19 academic year. A number of research projects from our engineering students for this year were displayed. The FOE had three (3) main display areas: 1) Mona Research Village in the Tent, 2) Displays on the Spine of the Faculty of Science and Technology, and 3) Research Day Signature Event on Friday, February 8, 2019 entitled "The 7 Wonders of LNG", which took the form of a presentation by Mr. Kevin Frantz (Senior VP, New Fortress Energy). All three (3) areas/events were well supported by the target audiences.
- Jamaica Institution of Engineers (JIE) Competition: The FOE organized and hosted the annual JIE Engineers' Week Bridge Building Competition for 2018. The UWI, Mona team, which consisted of second year Civil Engineering Students, won the competition (the team had the largest strength to weight ratio).
- *Faculty of Engineering Open Day:* The FOE held its first Open Day, November 8, 2018. Thirty two sixth form students and two teachers from six (6) high schools in the corporate area were hosted for the day. Activities were inclusive of information sessions, hands-on activities comprising lab demonstrations and engineering challenges such as; a mini-bridge building challenge, a drafting challenge using SketchUp or a robotics challenge. A survey conducted among the students revealed their responses to the open day events were positive. This is intended to expose students and stimulate their interest in the field of Engineering. It has become an annual event for the Faculty.
- *High School visits:* Representatives from the FOE in collaboration with the Marketing, Recruitment and Communications Department visited a number of high schools and community colleges during the academic year. This continues to

be our major marketing space for our programmes, and we make every effort to ensure that we fully participate.

- Visit to Bahamas: The Faculty of Engineering partnered with the Office of Student Recruitment to participate in outreach activities in the Bahamas. Dr. Omar Thomas (Deputy Dean, Outreach, Internationalization and Marketing) and Mrs. Bolero-Haughton (Assistant Registrar, Recruitment) visited the Bahamas November 13–16, 2018. The main intent was to promote the Faculty and its programs to prospective applicants. The team participated in radio and television interviews, as well as, college fairs for the Queens and Nassau Colleges. Fifty four of 280 participants expressed interest in our Engineering programs. Dr Thomas also met with Dr. Carlton Watson, Dean of Pure and Applied Sciences, University of Bahamas (UB). The FOE agreed to review courses under the UB associate degree programs to determine possible exemptions for the different engineering programmes in the FOE. After consultations with FOE faculty, it was decided that the UB Associate degree graduates could matriculate into first year of engineering degree programs. Dr Thomas also met with Ms. Melanie Roach, Director of Public Works, Bahamas. She expressed interest in having some of her employees pursuing the MPhil in Engineering, if most of the work can be done in the Bahamas. This is being assessed for future consideration.
- *Visit to Cayman Islands:* Dr. Aiken also visited the Cayman Islands to promote the FOE programs and explore the possibility of having partnerships with the University College of Cayman Islands (UCCI) February 25 to March 1, 2019. A proposal was submitted for a series of Professional Development seminars. Follow-up discussions are to be had on the way forward.
- *Marketing Opportunities*: The Faculty seized the opportunity for promotion and publicity on Sun City Radio by way of a quiz competition where questions were asked about the faculty and its programs and prizes were offered for the correct answers.

#### **Donations/Contributions**

*Engineering Bursaries:* The Faculty continues to assist needy students who meet the minimum eligibility requirements with an engineering bursary. The value of bursaries awarded range from J\$200,000 to J\$400,000. The recipients can be at any level in the programme and must maintain a minimum GPA of 3.0 to continue the bursary.

#### **Energy Management Unit**

• During the year, the Energy Management Unit contributed replacement Fluorescent Lamps to the General Stores Section.

- The Energy Management Unit has collected fluorescent lamps for crushing and removal of mercury, prior to disposal, from J Wray and Nephew and the Ministry of Science, Energy and Technology.
  - A total of 11,000 compact bulbs and 891 tubes were collected which yielded total revenue of J\$561,736.
- The EMU also submitted a proposal to PCJ for bulb crushing services, removal of mercury and disposal of fluorescent bulbs to be collected from Government buildings islandwide.

### **Employee Engagement and Development**

- The Faculty of Engineering hosted is annual Staff Retreat at the Faculty on June 19, 2019. The focus of the retreat was to look at our teaching and delivery systems, facilities, administrative system, and technical and support services. Measures to further improve our efficiencies and the finalization of the Faculty's strategic plan were discussed.
- Administrative Staff participated in a number of training and development programs for capacity building during the academic year.
- A workshop was hosted on October 25, 2018 for all academic staff entitled, *Aspects of Course Design and Development: An Outcomes-Based Approach.* This workshop was facilitated by the Centre for Excellence in Teaching and Learning (CETL).

#### **Graduate Research Degrees**

Currently there are nine (9) graduate students enrolled in the FOE. Five students are pursuing PhDs and four (4) are enrolled in MPhil programs. These students area of research span the fields of Biomedical, Civil Engineering, Electronics and Computer Engineering and Transportation Engineering.

Students attended a total of 16 seminars for the 2018/2019 academic year.

One PhD candidate, Mr. Da-Vaugh Sanderson, was a recipient of a UWI Postgraduate Scholarship totalling J\$1 million.

# PAPERS PRESENTED

- Ellis, Leighton "Prospective safety performance evaluation on Construction Sites in Trinidad and Tobago". Ellis, L.
- Farquharson, Cherri-Ann, An Investigation of Lightning Strikes Over Jamaica, Meteorological Service of Jamaica Lightning Forum, July 16, 2019.

- Lawrence, Adrian "Constructing and Handling Structures Designated as Massive Concrete". Lawrence, A., Tia, M., Bergin, M.
- McMorris, Nicolas "Mechanical Properties of Coconut Fibre Reinforced Concrete". McMorris, N., Anderson, S., Carty, M., Williams, R., Nugent, R., Vaccianna, A., September 2018
- Smellie, Stanley "How to save money with an Energy Audit". Smellie, S.
- Smith, David
  - "Nexus of Natural Disasters and Uninformed Planning Caribbean Terrace, A Case Study". Smith, D., Dolphin, T., Woodstock, R., DuQuesnay, A., McClue, A., Morrison, R.
  - Protection Services Provided by Mangroves in Jamaica, World Bank Workshop Oct 2018;
  - Green Climate Fund Conference in Grenada for Caribbean Adaptation Priorities Project, November 2018;
  - Member of the Jamaica Government Delegation to COP24 (UN Conference on Climate Change), Katowice, Poland December 2018; (d) Understanding Risk Workshop, Barbados, World Bank Workshop May 2019.
- Thomas, Omar S. "The application of semi-Markov modeling in estimating the crack deterioration of flexible pavements". Faculty of Engineering Graduate Seminar, April 4, 2019.
- Wright, Sasha-Gay "Biomedical Engineering of Jamaican Yam tuber for Drug Targeted Therapy in Prostate Cancer and its Potential Use in Green Nanotechnology Formulation". Wright, S., Aiken W., Asemota, H., JIE Conference September 2018.

# PUBLICATIONS

- Ellis, L.A., Martin, H. and S. Ramcharitar. (2019). "Factors influencing triple constraints in Public Sector Projects in Trinidad and Tobago". Proceedings of ICE –Management, Procurement and Law,172 (4): 157–169 https://doi.org/10.1680/jmapl.18.00047
- Ellis, L.A. and O. Mottley (2018). Prospective Safety Performance Evaluation on Construction Sites: Case Study Trinidad & Tobago. Jamaica Institution of Engineers (JIE) Engineers' Week 2018 Conference. September 17–21, 2018. Kingston, Jamaica.
- Han, S., Chun, S.; Lawrence, A., Tia, M. "Optimization of Design Parameters for Enhanced Integrity of Massive Drilled Shaft", *ASCE Journal of Materials in Civil Engineering*, Volume 31, No. 4, April 2019.

- Paterson, N. D. & Hutchinson, S. L. (2019). An exploratory look at Mentorship outcomes at a University in the Caribbean. *Caribbean Journal of Education*, Vol. 41 No. 1, 79–104, ISSN 0376-7701 © 2019 by the School of Education, the University of the West Indies, Mona.
- Oliveira, Roberto M., Alex B. Vieira, Latchman, Haniph A. and Moises V. Ribeiro. "Medium Access Control Protocols for Power Line Communication: A Survey." IEEE Communications Surveys & Tutorials (2018).
- Smith, D.A.Y. "Climate change impacts on critical international transportation assets of Caribbean Small Island Developing States (SIDS): The case of Jamaica and Saint Lucia". Published in Regional Environmental Change (2018). In addition, the paper will be included in the IPCC Special Report on 1.5 degrees itself, as part of the literature considered.
- Wright, S., Aiken, W., Adeyeye, M. and Asemota, H, The Anti-cancer effects of the Jamaican Round-leaf yellow yam (D. Cayenensis) and its Potential use for Green Nanoparticles. 27th International Conference on Composites/Nano Engineering, Granada Spain, July 14–20, 2019.

# **INCOME GENERATION**

• *Income for FOE:* Preliminary reports from Commercial Operations showed the FOE generated revenue of J\$269,634,522 from tuition collected for Preliminary program and four BSc programmes for the 2018/2019 academic year. Income of \$561,736 was also generated from other commercial activities primarily from the Energy Management Unit.

*Expenditure:* Total expenditure for the 2018–19 totalled \$235,731,405 million.

- *Mona-Tech Engineering Services (MTES):* MTES has successfully completed its fourth year of operations. Some notable achievements during the 2018–19 academic year were:
  - Provide oversight to the completion of the CoGen plant. Five 1.4 MW Jenbacher GE engines were commissioned in June and began powering the campus on Wednesday June 26, 2019
  - MTES is contracted to provide Operation and Maintenance services for the CoGen plant
  - Over the first two months of operation of the engines, the campus' JPS bill was reduced from J\$60 million to J\$17 million. Further reductions are expected after the exhaust chillers are commissioned in October 2019 and plant operations are optimized.
  - MTES continues to provide AC maintenance and repair services to the Mona and WJC campuses for a nominal contracted sum. All split and window units are serviced at least twice per year creating an estimated energy savings of over \$30 million per year.

#### PUBLIC SERVICE

#### Aiken, Paul

- The UWI Mona's representative on the BPO Task Force Committee chaired by the Honorable Dr Horace Chang
- Senior Member, Institute of Electrical and Electronics Engineers (IEEE)
- Member, Continuing Education Committee, Professional Engineers Registration Board (PERB)
- Member, Engineering Accreditation Committee, University Council of Jamaica (UCJ).

#### Ellis, Leighton

- Journal manuscript reviewer ASCE Journal of Management in Engineering (2012 – present)
- Journal manuscript reviewer ASCE Journal of Legal Affairs and Dispute Resolution in Engineering and Construction (2019–present)
- Chairperson for the Institution of Civil Engineers West Indies Local Association [ICEWILA] (2016–present)
- Vice President for Caribbean Water and Wastewater Association (CWWA).

#### Falconer, Lindon

- Member of the IEEE and the Acoustical Society of America.
- Examiner, Board of Examiners (Licensing of Electricians) Ministry of Science, Technology, Energy and Mining (MSTEM).

#### Lawrence, Adrian

- Peer reviewer, American Concrete Institute's (ACI) Journal
- Reviewer for the American Concrete Institute's (ACI) Technical Activities Committee (TAC)
- Instructor, Professional Engineering (PE) License Exam, United States
- Serves on the Jamaica Bureau of Standards' Building and Associated Materials Technical Committee.

#### McMorris, Nicolas

- Member, Board of Directors of the Professional Engineering Registration Board (PERB)
- Assistant Chief Examiner, CAPE for Building & Mechanical Drawing.

# Smith, David

- Member, Greater Caribbean Regional Engineering Accreditation System (GCREAS).

# Thomas, Omar

- Member, Jamaica Institution of Engineers (JIE)
- Registered Professional Engineer in Jamaica
- Member, Financial Committee, Karen Peart Foundation
- Member, American Society of Civil Engineers Transportation &
- Development Institute (T&DI) Infrastructure Systems Committee
- Lead Facilitator of the Macaroni Bridge Competition JIE Engineers' Week
- Member, Institute of Transportation Engineers.

# Other Staff Highlight

- Mr Lindon Falconer, Head of Electronics & Electrical Programs appeared in the *Jamaica Observer* on January 21, 2019, the Jamaica Gleaner on January 22, 2019, and in a JIS article about the National Innovation Award that he received. The article highlighted his contribution to science and technology in bringing a new electronic security product to the market The Falcon B4. He placed 1st in the category of Engineering and Manufacturing for the National Innovation Competition held November 21, 2018.
- Mr Falconer also conducted listening tests on 20 adults over the age of 50 years, whose hearing were impaired. The tests were done at the University of Sheffield in England. Results from this work will be used for the completion of his PhD thesis.

# STUDENTS

# Internship

Huawei Jamaica Seeds for the Future Program 2019: Three final year students from our Electronics Engineering program were beneficiaries of the annual Huawei Jamaica Seeds for the Future program. The students did a two week internship at Huawei in China. Feedback from the students was that the experience was very educational. All major expenses for the students stay in China were covered by Huawei.

# **Student Clubs and Societies**

Students of the Faculty of Engineering were actively involved in the campus chapters of the following professional bodies:

- Institute of Electrical and Electronics Engineers (IEEE)
- The FOE robotics team commenced the design of a robot to enter the robotics competition at the 2020 IEEE South East Conference. The goal is to design a robot that capable of manipulating Lego blocks and LED lights.
- Jamaica Institution of Engineers (JIE)
- Institute of Structural Engineers (IStructE)
- The students have also formed an umbrella club the Mona Engineering Society (MES) the club will be officially launched within the month of September 2019.

#### **Scholarships and Bursaries**

#### Scholarships

- *The Ministry of Education, Youth and Information (MoEYI):* At the start of the 2018/2019 academic year, it is recorded that eight (8) students of the Faculty of Engineering were recipients of the MOEYI Maths, Science and Technical and Vocational Education and Training (MSTVET) Scholarship. The number of scholarship recipients from FOE increased to 20 for the 2019/2020 academic year.
- *Class of 1967 Scholarship:* The first Class of 1967, scholarship was awarded October 19, 2018. The recipient was Mr Jachin Mullings, Guild Representative and President of the student body Mona Engineering Society, for excellence in innovation and leadership.
- *Elaine Bryan Scholarship:* Three (3) engineering students received scholarships from the Elaine Bryan Foundation. The scholarships include the disbursement of computers to students enrolled in Science, Technology, Engineering, Art and Mathematics (STEAM) programmes. The Faculty, intends to maintain its close partnership with the Elaine Bryan Foundation. It is felt that recipients of the scholarship should keep in touch with the foundation on an ongoing basis, particularly throughout the remainder of their tenure here as students at The UWI.
- Our students continue to benefit from other scholarship opportunities such as: the Jamaica Flour Mills and New Fortress Energy Scholarships.
- *Bursaries:* Our students continue to benefit from a number of bursaries during the 2018–19 academic year. Table 1 below shows a summary of bursaries disbursed per programme, total awarded and the percentage per program.

Engineering Programmes	Number of Awardees	Total Awarded	% of bursaries awarded according to programme
Biomedical Engineering BSC M	7	2,900,000.00	11 %
Civil Engineering BSC M	20	6,990,000.00	31%
Electrical Power Engineering BSC M	5	2,240,000.00	8 %
Electronics Engineering BSC M	12	5,875,785.00	119%
Preliminary Engineering NA M	20	9,620,000.00	31%
Grand Total	64	27,625,785,00	100%

Table 1: Number of Bursaries Awarded

• The Government of Jamaica (GOJ) through the Student Loan Bureau (SLB) have once again responded to continued requests from the Faculty of Engineering for increased access to loans for our engineering students. The loan threshold has been increased to J\$1M for the 2019–20 academic year up from J\$831,069.17.

# 2018 Graduation

A total of 40 students graduated, November 2018. A total of six (6) first class honours were awarded, four (4) from the Civil Engineering and two (2) from the Electronics Engineering programs.

#### **COURSES MODIFIED**

LEVEL 1 COURSES ELECTRONICS, BIOMEDICAL AND ELECTRICAL POWER					
Semester	Course Code	Title			
1	ECSE1102	Engineering Circuit Analysis and Devices			
1	ECSE1104	Digital Circuits and Systems			
1	ECSE1109	Programming for Engineers I			
1	ENGR1100	The Engineering Profession			
1	ENGR1105	Engineering Laboratory and Designs I			
2	ECSE1207	Computer Architecture and Organization (NEW)			
2	ECSE1209	Programming for Engineers II			
2	ECSE1209	Programming for Engineers II			
2	ELNG1101	Physics for Engineers			
2	ENGR1200	Engineering Tools and Techniques			
2	ENGR1200	Engineering Tools and Techniques			
2	ENGR1205	Engineering Laboratory and Designs II			
2	ENGR1205	Engineering Laboratory and Designs II			
2	EPNG1201	Intro to Thermodynamics and Fluid Mechanics			
2	EPNG1210	Electrical Machines I			
	LEVEL 2 COURSES				
1	ECSE2102	Semiconductor Devices and Fabrication			
1	ECSE2104	Microprocessors and Embedded Systems			
1	ECSE2106	Signals and Linear Systems			
1	ENGR2105	Engineering Laboratory and Designs III			
1	ENGR2120	Technical Communications I (NEW)			
1	EPNG2110	Electrical Machines II			
2	ENGM2210	Engineering Electromagnetics (NEW)			
2	ECSE2202	Analogue Circuits and Instrumentation			
2	ECSE2208	Analogue and Digital Communication Systems			
2	ECSE2209	Control Systems Engineering			
2	ECSE2209	Control Systems Engineering			
2	ENGM2280	Probability and Statistical Systems (NEW)			
2	ENGR2205	Engineering Laboratory and Designs IV			
2	EPNG2010	Nuclear Physics and Reactor Theory			
2	EPNG2020	Renewable Energy Systems			