FACULTY OF
ENGINEERING

Year Ending July 31st, 2022

Dean

Dr. Adrian Lawrence
Ph.D., P.E.

OVERVIEW

During the 2021-22 academic year, the Faculty of Engineering (FOE) continued to effect changes to the curricula of its programmes. These modifications are a part of an ongoing endeavour to improve course content, bringing them in alignment with recommendations from ABET, as well as, the teaching and learning objectives of the Faculty. Some course codes were also changed to eliminate confusion with the UWI, St Augustine courses.

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 Faculty of Engineering and the University on a whole, begun the new Academic year where it ended the previous year; rebounding from the ill effects of the global pandemic. With the deleterious effects of the pandemic taking hold on the world economy, Academic Year 2021/2022 saw a decline in the total number of applications to the Faculty which resulted in the total number of new students registered slightly decreasing in comparison to Academic Year 2020/2021, Figure 1. This reduction in new students saw the total registration in the Faculty moving from three hundred and twenty-six (326) students in 2020/2021 to three hundred and twelve (312) in 2021/2022. As in previous years, the Civil Engineering degree programmes registered the highest number of new students of all the degree programmes. Table 1 shows a breakdown of new student registration by programme as well as a breakdown of the total registrations in terms of new students versus returning students.

Table 1: Breakdown of Student Registration

Preliminary Engineering	44
Biomedical Engineering	12
Civil Engineering	37
Electrical Power Engineering	9
Electronics Engineering	15
Total New students	**117**
Returning Students	**195**
Total in Programme:	**312**

The Faculty delivered all course lectures online in Semester I, however the laboratory and practical component of these courses were all conducted in in-person/face-to-face format. In Semester II, recognising that the learning outcomes for the Engineering Mathematics courses were not being met, the Faculty made the decision to make in-person/face-to-face attendance mandatory. Having assessed the conduct of the engineering mathematics courses, this mandate was extended to the Level III students as they had only experienced one full semester face-to-face contact with their lecturers. While the pandemic has presented many challenges, several growth opportunities have materialized. The move to online course delivery has allowed us to extend the reach of Engineering at Mona. The Faculty Team - administrative, technical and support staff - has been showing high school graduates that the engineering education they receive at Mona is equivalent, and in fact is superior, to that of most other institutions. The following accomplishments mirrored the guiding pillars of the University.

ACCESS

1.1.STUDENT ACHIEVEMENT

1.1.1.Prizes Awarded to Students

Faculty of Engineering 2020 graduate, Ms. Telica Mussington (B.Sc. Civil Engineering), was in July 2022 named a Chevening Scholar 2022/2023. Telica will be pursuing a Master of Science in International Development: Environment, Climate Change and Development at the University of Manchester. Ms. Rachelle McFarlane, Ph.D. student in the Faculty of Engineering was selected to participate in the Emerging Leaders in the Americas Program (ELAP) Exchange Programme at Ryerson University in Toronto, Canada. The programme ran from January 2022 until July 2022.

Engineering student, Mr. Lowarn Martin, competing against students from the University of Technology (UTECH), Caribbean Maritime University (CMU) and the Portmore Community College (PCC), was the overall winner of the Jamaica Institute of Engineers (JIE) "Elevator Pitch" competition. Mr. Martin had to respond to two scenarios. The first scenario was: "You are in an elevator, the Minister of Health enters the elevator. As an engineering student, you are of the view that engineering principles or technology can be used in the Nation's fight against Covid. In 90 seconds or less, pitch your

idea or ideas to the Minister of Health." For the second round Mr. Martin had five (5) minutes to think of a pitch he would make to the CEO of a company at which he desired to do an internship.

1.1.2.The Next S.T.A.G.E.

The Faculty of Engineering collaborated with the Mona Engineering Society and the Faculty of Engineering Alumni Association, Mona (MES), to host a virtual event entitled "The Next S.T.A.G.E." (Scholarships, Transition and General Employment), on March 3, 2022. The aim was to heighten awareness, among current FOE students and prospective students, of scholarship and other funding opportunities available to them. The event also focused on giving students insight on what employers and scholarship application reviewers were looking for. The goal of this component was to enable individuals to better package themselves for success in these endeavours. This event replaced our usual open day.

1.1.3.High Schools Visits

Representatives from the FOE collaborated with the Marketing, Recruitment and Communications Department to host a number of virtual and in person information sessions with high schools and community colleges, during the academic year. The virtual platform continued to be the major marketing space for our programmes. The Faculty continued to pivot and adjust with the prolonged impact of the pandemic, as we made every effort to pursue new student recruits and fully participate in the University's promotional and recruitment process.

1.2.TEACHING AND LEARNING

1.2.1.Taught Graduate Degrees

The Faculty's taught master's degree, the M.Sc. Engineering and Management, commenced and had three (3) students enrolled in Academic Year

2021/2022. The programme is being delivered in collaboration with the Mona School of Business and Management and seeks to offer practical and theoretical knowledge of modern engineering, along with a solid grounding in management techniques and their application to the field of engineering. The students sat courses in Business Analytics, Financial & Managerial Accounting, Global Supply Chain Management, and Quantitative Methods and Statistical Techniques.

1.2.2.Summer School

The Faculty of Engineering offered and delivered its first Summer School programme from May 30, 2022 to July 8, 2022. The courses available to the students were ENGR0120 Preliminary Engineering Mathematics I, ENGR0220 Preliminary Engineering Mathematics II, ENGR1180 Engineering Mathematics I, MATH2230 Engineering Mathematics II and ENGM2280 Engineering Statistics. These courses were selected by the Faculty after an analysis of student performance revealed a historical trend of high failure in the fundamental mathematics courses which had two effects, students struggling in courses in which a sound mathematics foundation is required for success and students subsequently falling behind in their programme of study. The programme had a successful first year of operation and going forward the Faculty intends to market the summer delivery of the Preliminary Engineering Mathematics courses to incoming new students, who have not obtained passes in CAPE Mathematics Unit 1 and/or Unit 2, as a means by which they may enter any of the Faculty's four B.Sc. programmes in their first year of entry into the University.

1.2.3.International Accreditation

The Faculty has advanced preparations for the next visit of the ABET review team for re-accreditation of the BSc in Electronics Engineering programme in 2023. A series of workshops are being held in preparation for the visit to ensure conformity to ABET's requirements. The faculty is desirous of obtaining this re-accreditation and first time accreditation for our three remaining BSc programmes; Civil, Electrical Power and Biomedical Engineering, as we maintain our efforts towards continuous improvement and maintaining high standards in our academic offerings and delivery modalities. **Four (4)** new undergraduate courses were introduced and **four (4)** courses were revised. These adjustments are intended for continuous improvement of course content, aligned to ABET's recommendations and the

FOE teaching and learning objectives.

ALIGNMENT

2.1.RESEARCH AND INNOVATION

2.1.1.Graduate Research Degrees

In Academic Year 2021/2022, there were eleven (11) research focused graduate students enrolled in the Faculty of Engineering. Three (3) students pursuing PhDs and eight (8) enrolled in MPhil programmes. The students' area of research spanned the fields of Biomedical, Civil Engineering, Electronics and Computer Engineering, and Transportation Engineering. Students attended a total of five (5) seminars for the 2021/2022 academic year. These presentations exposed graduate students to the varying research methodologies employed by lectures, and were introduced in an effort to broaden the scope of knowledge exchange within the Faculty which was intended to enhance the quality of the research output of the Faculty.

2.1.2.Published research

Published research from faculty members either addressed or were geared towards finding solutions to real problems. Publications from Faculty members were as follows:

- *Sheena Francis, Chelsea Frank, Luke Buchanan, Sean Green, Roxann Stennett-Brown, Georgiana Gordon-Strachan et al. Challenges in the control of neglected insect vector diseases of human importance in the Anglo-Caribbean, One Health, Volume 13, 2021, 100316, https://doi.org/10.1016/j.onehlt.2021.100316.*
- *Haniph A. Latchman, Signals and Systems and their Applications – A transform-based Approach, John Wiley and Sons, to appear, November 2021.*
- *Asundi, S.; Fitz-Coy, N.; Latchman, H., Evaluation of Murrell's EKF-Based Attitude Estimation Algorithm for Exploiting Multiple Attitude Sensor Configurations. Sensors 2021, Vol. 21 No. 19, Special Issue on Attitude Estimation Based on Data Processing of Sensors, pp 1-23, October 2021, https://www.mdpi.com/1424-8220/21/19/6450.*
- *Rakhee, Complexity Analysis of Wireless Body Area Networks Using Soft Computing Technique, The Italian Conference on Theoretical Computer*

Science (ICTCS). Oral Presentation at the conference and the manuscript will appear in Springer Proceedings Books on Lecture Notes in Networks and Systems (LNNS).

- *Omar S. Thomas*, Georgeann Henry, Kordel Bishop, Kymani Francis, and Ajene Binn, "Analysis of Bamboo as Flexural Reinforcement in Foundations". West Indian Journal of Engineering. September 2021.*
- *Madhushalini, Rakhee, "Complexity Analysis of Wireless Body Area Networks using soft computing Technique", sixth International conference on Information and Communication Technology for Competitive Strategies, Dec 17-18, 2021, Jaipur, India, Indexed by SCOPUS, INSPEC, WTI Frankfurt eG, zbMATH, SCImago, Web of Science. All ICTCS 2021 presented papers will be published in conference proceedings by Springer LNNS. ISSN: 2367-3370 Series.*
- *Rakhee, " Improved cluster-based energy-efficient protocol for WBAN using soft computing", 3rd International Conference on Computing Science, Communication and Security (COMS2 - 2022), Ganpat University, Feb 6-7, 2022, Gujarat, India, Indexed in SCOPUS, Springer CCIS H index:5.1, SCimago Journal. Rank :0.16 and Impact factor 0.48. (submitted).*
- *Jordan Madden, Kolapo Alli, Lindon Falconer, "An AI-Based Visual Navigation System for the Blind," in IEEE Transactions on Human-Machine Systems. Impact Factor 2.968 (Submitted).*
- *Neha Nirbhay, Rakhee, Lindon Falconer, "Improved Cluster based energy efficient routing protocol for WBAN using Soft Computing Technique", Feb 6-7, 2022, Ganpat University, Gujarat, India, International Conference on Computing Science, Communication and Security(COMS2), Indexed by SCOPUS, Web of Science, DBLP, ACM DL, EI-Compendex and inclusion in ISI Proceedings. All accepted, registered and presented papers will be published in the Springer Communications in Computer and Information Science (CCIS) series Conference Proceedings ISSN: 1865-0929.*
- *Falconer, Lindon, Andre Coy and Jon Barker (2022). "Modelling the Effects of Hearing Aid Algorithms on Speech and Speaker Intelligibility as Perceived by Listeners with Age-Related Hearing Loss." Intelligent Systems Conference (IntelliSys) 2022.*

2.2.NATIONAL ENGAGEMENT & OUTREACH

2.2.1.The Rehabilitation Outreach Initiative *(ROI)*

Lecturer and Deputy Dean of the Faculty, Dr. Roxann Stennett-Brown is currently on a Developed Country Impact Modelling Analysis for SRM (DECIMALS) as part of the Degrees Initiative and is assessing the impact of solar radiation management climate change on caribbean agriculture. Lecturer and Deputy Dean of the Faculty, Dr. Omar Thomas, is the Principal Investigator working on a national project in partnership with the Jamaican Government's Ministry of Economic Growth and Job Creation, under the theme: "Supporting Sustainable Transportation through the Shift to Electric Mobility in Jamaica".

The Faculty of Engineering has established a Rehabilitation Outreach Initiative (ROI) to assist with the repair of biomedical engineering equipment. This initiative is being done as a part of a Biomedical Engineering Society outreach programme. The ROI carried out two projects in Academic year 2021-2022, the repair of an electric scooter for the office of special student services, and the repair of a wheelchair for a patient in the Liguanea area who was born with physical disabilities. The ROI also procured a wheelchair which will be donated to the faculty for use in laboratory activities of BMNG 3240 - Rehabilitation Engineering and Design.

2.2.2.JIE Top Performing Engineering Student Award

The Faculty of Engineering collaborated with the Jamaica Institution of Engineers (JIE) and New Fortress Energy (NFE) to establish a two-year partnership that will see three top-performing engineering students from the island's three tertiary institutions being recognised for their hard work and awarded with the JIE/NFE Engineering Student of the Year award. The JIE/NFE Engineering Student of the Year award is opened to all final-year students studying an engineering discipline at The University of the West Indies (UWI), Mona and St Augustine campuses; the University of Technology, Jamaica (UTech) and the Caribbean Maritime University (CMU). The student with the highest grade point average from each institution will be awarded with a trophy during the JIE's annual awards dinner and gala. The three selectees will also have the opportunity to complete an internship with New Fortress Energy

AGILITY

3.1.REGIONAL & INTERNATIONAL COLLABORATION

3.1.1.2+2 Programme

The Faculty continued its collaboration with the University of Florida (UF) on the 2+2 Programme which allows for UWI students to transfer into one of UF's B.Sc. Engineering programs. One student who applied to participate in the programme met all the requirements to make the transfer UF for the Fall Semester of 2022. This student will pursue a B.Sc. in Aerospace Engineering.

3.1.2.West Indies Summer Engineering *(WISE)*

The Faculty of Engineering submitted a proposal for a six (6) week summer program hosted on The UWI Mona Campus called the West Indies Summer Engineering (WISE) Programme. This programme will be a collaboration with the Herbert Wertheim College of Engineering at the University of Florida (UF). The programme will target high school students and Preliminary Engineering students, who may have an interest in Engineering. The program will expose these students primarily to selected disciplines of study of Engineering that are not currently being taught at The UWI Mona. However, the students will also get the opportunity to tour the Faculty of Engineering and the wider UWI Mona Campus. The Faculty of Engineering at UWI Mona expects that the program will be an asset to their recruitment efforts since some students may choose to pursue their Engineering degree at The UWI Campus and or participate in the UWI-UF collaboration. Therefore, the success of the proposed summer program is expected to provide an opportunity for mutual benefits for The Faculty of Engineering at The UWI Mona and for the College of Engineering at UF.

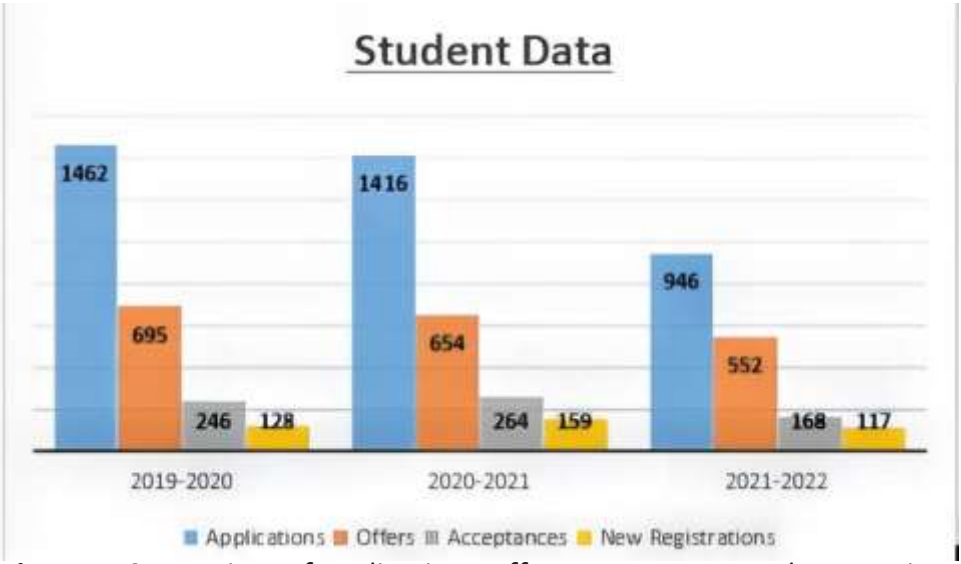

Figure 1: *Comparison of applications, offers, acceptances and new registrations in Academic year with the prior two academic years*