



DEPARTMENT OF MATHEMATICS

Dr. Nagarani Ponakala, M.Sc, M.Phil & Ph.D (India) – Head of Department

OVERVIEW

For the 2022/23 academic year, the department returned to face-to-face classes for all the undergraduate courses, and graduate courses were offered in blended mode with 75% of its teaching remaining online. The department started the academic year with 12 full-time academic staff, 4 Administrative staff, and 3 support staff by joining Mr. Horace Johnson as a full-time lecturer in the field of Actuarial Science while replacing Ms. Britta Hay, whose contract ended in July 2022. Department took the support from several Adjunct staff and is thankful for their commitment and contributions. During this year, the department suffered the great loss of an esteemed colleague **Mr. Winston St. Elmo Whyte**, who passed away on March 3, 2023. During his tenure with us, Mr. Whyte served as a Director of the Actuarial Science programme at the level of Senior Lecturer in the Department for more than 15 years. Though the year started slowly with uncertainty because of the COVID-19 pandemic situation, the strong commitment and hard work of all the members of staff ensured the department that the quality and standards were maintained at their highest and ended the academic year productively by successfully achieving most of our strategic objectives, though facing some serious constraints in terms of the resources available for the Department and also while missing our esteemed colleague.

During this year, Dr. Victor Job, received a CETL Faculty Award for achieving 4.5 and above in the 2021–2022 UWI Student Evaluation of Teaching and Dr. Tamika Royal-Thomas received two Principal awards for the Best Research Publications for the years 2019–2020 and 2021–2022.

DEPARTMENT ACTIVITIES AND OUTREACH

The department conducts various in-reach and outreach activities for the support and growth of our students and staff and also to service the wider public. We initi-

ated our student supporting activities with a **Meet & Greet** activity on September 15, 2022, with our 2nd and 3rd year students. This activity was well received by the students as they got the opportunity to spend time on an informal setup with all members of the Department. Thanks to our Dean Prof. Michael Taylor and Associate Dean for Student Experience Dr. Marvadeen Singh-Wilmott who were present and motivated our students. We have also organized the **Department Orientation** and a team of staff members met our students of all levels. The department has been getting positive feedback for several years as this is where all their questions regarding their programmes and career will be answered and guided. For Breast Cancer Awareness Month the Department in Association with the UWI Actuarial Society held our **Pink Day** on October 27, 2022. The Department of Mathematics hosted its 10th **Annual Career Fair** on November 11, 2022, via Zoom. The keynote speaker was alumni and CEO of One-on-One Educational Services, Mr. Ricardo Allen. A total of 15 companies along with members of the Caribbean Actuarial Association (CAA) participated in the Career Fair and 51 students registered. The participating companies were: Sagicor Group Jamaica Limited; Canopy Insurance Limited; GraceKennedy Limited; Scotiabank; CG United Insurance Limited; Barita Investments; Eckler Jamaica; Quantas Capital Limited; Statistical Institute of Jamaica; Mathwiz Academy; National Commercial Bank; Financial Services Commission; Jamaica National Group; Wysinco Limited; KRYS Global Limited. In preparation for the Career Fair, a Soft Skills Seminar was held on Thursday, November 3, 2022, and our guest speaker was Ms. Tanya Francis, Senior Administrative Assistant at OSS-Placement and Career Services. Students benefit from going through these seminars and the mock interviews.

The Department celebrated **International Day of Mathematics** on March 14, 2023. To mark the event Dr. Victor Job hosted a talk for the students titled “Mathematics for Everyone” which was well received. As a part of the University’s 75th anniversary celebrations, Dr. Diptiranjana Behera led the department’s participation at the **Science Festival** from March 31, 2023, to April 1, 2023, at the Faculty of Science and Technology. The department managed a booth and the student volunteers and department members engaged primary, high school, and university students on both days with trivia questions, the Tower of Hanoi, and other games. Several research posters were displayed at the booth and a 15-minute talk on ‘Mathematical Models in Real Life’ at the Science Festival by Dr. Nagarani Ponakala.

The Department held its **Industry Advisory Board (IAB)** meeting on April 14, 2023, with department members, FST Associate Dean, Dr. Daniel Fokum, student representative, Ms. Mickhalia Thomas, and nine (10) Industry representatives from Scotiabank; Grace Kennedy; Statistical Institute of Jamaica; National Commercial Bank; New Fortress Energy; Financial Services Commission; CG United Insurance; Jamaican Association on Intellectual Disabilities, which was led by the Acting Chairman of IAB, Mr. Horace Johnson.

The Department's annual **Summer Internship programme** launch was held on Thursday, April 13, 2023 in the Mathematics Lecture Theatre. Approximately twenty-five (25) students were in attendance along with department members, representatives from the faculty, and two (2) members from the participating companies; Mr. Aldington Smith from Jamaica Public Service and Mrs. Alecia Newell-Williams from Statistical Institute of Jamaica. The Guest Speaker, Mr. Timar Jackson, Assistant Vice President in Origination and Structuring at NCB Capital Markets who is our past student, set the tone of the launch and the expectations of the interns. The students were receptive to the presentation and took the opportunity to speak with Mr. Jackson. During this year, 18 students were positioned in these summer internships and the breakdown is, Jamaica Public Service (2), Statistical Institute of Jamaica (3), Business Intelligence (4), KYRS Global (2), Guardian Life (1), Digicel (2), Best Dressed Chicken (1), Tax Administration of Jamaica (1), Grace Kennedy (2). Also several of our students got full-time positions and also a year-long internship opportunity through this programme.

This academic year, with a year of gap due to COVID, we organised our **Jamaican Mathematical Olympiad** programme in face-to-face mode. This year's programme was led by Dr. Samuel McDaniel, Academic Coordinator and Mr. Horace Johnson, Financial Coordinator with other very enthusiastic and dedicated members of the Olympiad Committee. Strong interest was observed from the schools, especially at the primary level and this programme was well supported by the University and external organisations. We thank the entire University community for the great encouragement and support and the sponsors for their interest in the programme and support. New Fortress Energy again came on as our title sponsors by donating 1 million JMD, which is the third time in a row, The Caribbean Actuarial Association (CAA) (250,000 JMD), First Caribbean International Bank (CIBC) (250,000JMD)) and UNESCO (2,000 USD).

Our Junior and Senior qualifying rounds commenced in November 2022, received submissions from 30 High Schools with a total of 491 students and 111 Primary and Prep schools with approximately 2300 students. We had held two rounds for Junior Olympiad and three rounds for Senior Olympiad including the final rounds. The Junior Math Olympiad first round was held on February 8, 2023, with approximately 1900 students representing about 128 prep and primary schools and the final round was held on March 15, 2023 with approximately 700 students participated from about 88 schools. The Senior Math Olympiad first round was held on February 11, 2023 with 400 students participated and the final round was held on April 1, 2023 with approximately 80 students from 16 High schools were participated.

A total of 92 students from both Senior and Junior Schools were being awarded at the Award Ceremony held on May 24, 2023. The former Prime Minister of Jamaica - The Honourable Bruce Golding was our keynote speaker for the ceremony.

This year we had a team of students that competed in the Central American and Caribbean Mathematical Olympiad (OMCC) which was held from July 21st–29th in El Salvador. Four of our students that participated in the Senior Math Olympiad were selected to compete, they were, Austin *Martin* (Herbert Morrison Technical High School), Jo`Anna Hill (Montego Bay High School), Joshua Walcott and Cruz Caine (Campion College).

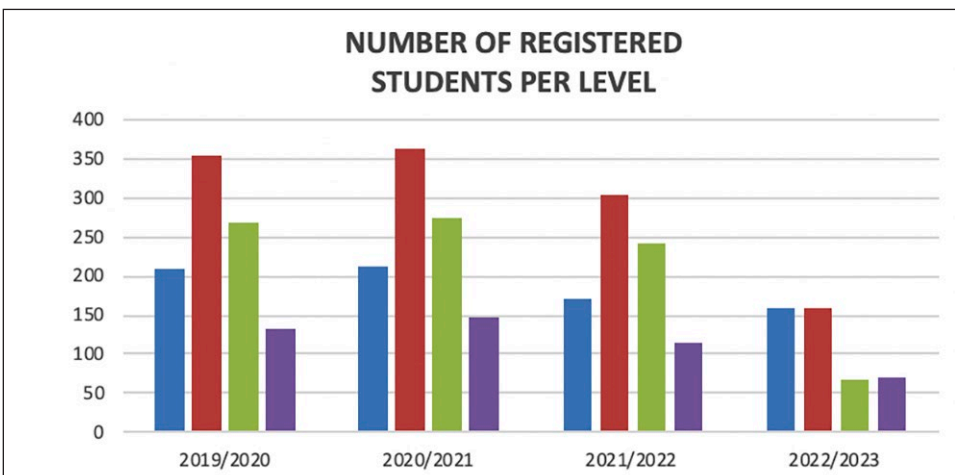
ACCESS

STUDENT MATTERS

Undergraduate Programmes and Students:

This academic year many of our students received awards and recognition from both internal and external source. The **Caribbean Actuarial Scholarship** winners for 2022–23 were Ruth-Ann Blair from final year (received USD 3000) and Lamar Wilson from second year (USD 2000). **IFOA Foundation Fullerton – Long Caribbean Scholarship** winners are: Jayde Noel-Sailsman, Level II Actuarial Science major (USD 2,150.00), Daynia-Ann Holness, Level II, Actuarial Science major (USD 2,150.00), Kaniellia Hunter, Level II, Actuarial Science major (USD 2,150.00). The **Long Actuarial Scholarship** was extended to Abigail McFarlane, level III (USD 2,000) for 2022–23, who was also a recipient of the same award in 2020–21 and 2021–22. The Stephen Alleyne Memorial Scholarship recipient is Brian Milton.

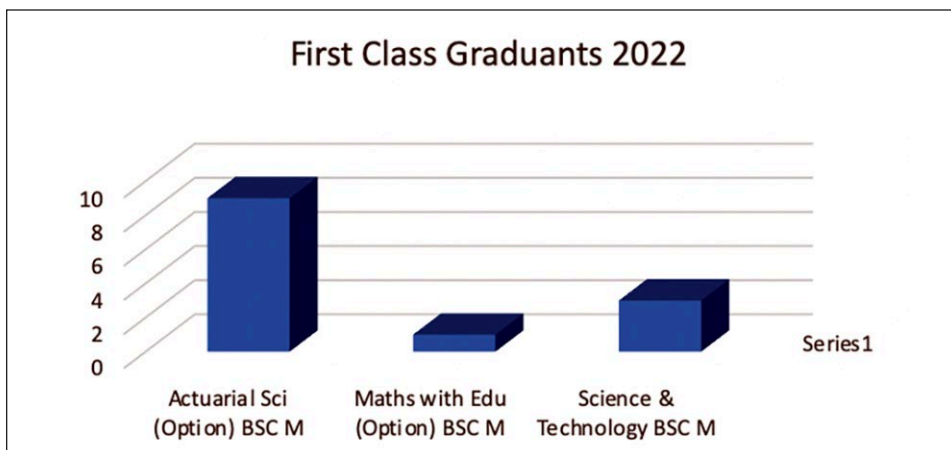
The Following students were awarded for the Departmental Awards for the 2022/2023 Academic Year. The Department of Mathematics Prize – Joshua Grant (Level I), Merville Campbell Prize – Ms. Ruth Ann Blair (Level II), Henry-Aub Prize – Ms. Abigail McFarlane (Level II).



For the past five years, a total of 408 undergraduate students graduated from the department. This is broken down as follows:

2018	2019	2020	2021	2022
86	83	78	105	56

In November 2022, a total of 13 students graduated with First Class Honours broken down as follows:



We continue to offer our one-on-one student experience through our annual Career Fair to improve their soft skills to prepare them to transit better to the work world after graduation.

Graduate Programmes and Students

MSc Enterprise Risk Management

Our Master of Science programme, Enterprise Risk Management, run in partnership with MSBM saw for the 2022/23 academic year, 8 students joined cohort 11, 11 students from cohort 10 moved on to their second year, while 13 students graduated from cohort 8 and 9 combined.

MSc Mathematics

As this programme is normally offered bi-annually, a new cohort joined in January 2022. At the end of the semester based on outstanding academic performance Mr. Jarvis Hayman was awarded the MSc. Bursary award for 2022/2023 academic year.

MPhil/PhD Mathematics

As of August, 2022, the department has 4 MPhil students and 3 PhD students research students registered. **Ms. Roxanne Francis**, Special Instructor as well as an M.Phil student, received a fund of USD3000 as the Research & Publications Fund

from Office of Graduate Studies and Research (OGSR) to support her travels to the international workshop on Non-Linear Stability of Thermoconvective Flows in Bangalore, India, held during the period January 9–14, 2023.

PUBLICATIONS

Journal Articles

- E. Braverman and **A. Rodkina**, Stabilizing multiple equilibria and cycles with noisy prediction-based control, *Discrete and Continuous Dynamical Systems - Series B*, (2022) 27(10), 5419–5446.
- **Behera Diptiranjan**, Chakraverty S., Computational technique for solving imprecisely defined non-negative fully fuzzy algebraic system of linear equations, *International Journal of Fuzzy Logic and Intelligent Systems*, Vol. 22 (3) (2022) 252–260, DOI: <https://doi.org/10.5391/IJFIS.2022.22.3.252>
- **Diptiranjan Behera**, Linear combination-based approach for solving imprecisely defined algebraic system of linear equations under fuzzy uncertainty, *International Journal of Fuzzy Logic and Intelligent Systems*, Vol. 23(2) (2023) 173–180, DOI: <https://doi.org/10.5391/IJFIS.2023.23.2.173>
- **Mahesha Narayana**, R. Saha, P.G. Siddheshwar, S.S. Nagouda, Individual effect of spatially periodic vertical surface temperatures and nanoparticles on natural convection in water, *ASME Journal of Heat and Mass Transfer* (2023) 145(7), Art. ID. 072601.
- **Mahesha Narayana**, P.G. Siddheshwar, Solution of boundary eigenvalue problems and IBVP involving a system of PDEs using the successive linearization method, *ZAMM* (2023), Art. ID. e202200472.
- P.G. Siddheshwar, **Mahesha Narayana**, D. Laroze, C. Kanchana, Brinkman-Bénard convection with rough boundaries and third-type thermal boundary conditions, *Symmetry* (2023), 15 (8), 1506.
- R. Saha, **M. Narayana**, P.G. Siddheshwar, S.S. Nagouda, Thermo-convective flows of mono- and hybridnanofluids over horizontal undulated surfaces in a porous medium, *Journal of Nanofluids* (2023),12, 514–534.
- **R. Francis***, **M. Narayana**, P.G. Siddheshwar, Gravity-modulated Rayleigh-Bénard convection in a Newtonian liquid bounded by rigid free boundaries: a comparative study with other boundary conditions, *Journal of Engineering Mathematics* 2023, 139(1), 5.
- **A. Small***, **P. Nagarani**, M. Narahari, Peristaltic pumping of an Ellis Fluid in an inclined asymmetric channel, *J. Appl. Math. & Informatics* (2023), 41(1), 51–70.

- Sreedhara Rao Gunakala, **Victor M. Job**, **P. Nagarani**, P. Sreenivasulu and Judith N. Balkissoon: Numerical Study of Unsteady MHD Poiseuille Flow with Temperature-Dependent Viscosity through a Porous Channel under an Oscillating Pressure Gradient, *Palestine Journal of Mathematics* 11 (Special Issue III), 41–52, 2022
- S.R. Gunakala, **Victor M. Job**, P.V.S.N. Murthy, **P. Nagarani**, H. Seetharaman, B.V. Chowdary: In-silico investigation of intratumoural magnetic hyperthermia for breast cancer therapy using FePt or FeCrNbB magnetic nanoparticles. *International Journal of Thermal Sciences*, 2023, 192 Part A: 108405.
- Gunakala, Sreedhara Rao and **Job, Victor M.** and Murthy, P. V. S. N. and Sakhamuri, Sateesh, Influence of alternating magnetic field on non-Newtonian blood perfusion and transport of nanoparticles in tissues with embedded blood vessel during hyperthermia, *Ain Shams Engineering Journal* (Elsevier), 2023, 14 (1), 101831, <https://doi.org/10.1016/j.asej.2022.101831>.
- **Victor M. Job**, Sreedhara Rao Gunakala, Rama Subba Reddy Gorla, O.D. Makinde, H. Thameem Basha: Unsteady convective ferrohydrodynamic flow MnZnFe₂O₄/FeCrNbB-EG hybrid nanofluid in a horizontal channel with porous fins and semi-circular heaters, *Journal of Magnetism and Magnetic Materials* 571(1): 170584 (2023).
- Gunakala, Sreedhara, **Job, Victor**, Alexander, Maraika. (2022). MHD Slip Flow and Heat Transfer with Ohmic Heating between a Rotating Solid Disk and Stationary Permeable Disk. *Engineering Innovations*. 3. 1–12. 10.4028/p-d6t7o5.

CONFERENCE PROCEEDINGS

- Gunakala, S.R., **Job, V.M.**, Veronique, J. (2022). Influence of Heat Transfer, Chemical Reaction and Variable Fluid Properties on Oscillatory MHD Couette Flow Through a Partially-Porous Channel. In: Rushi Kumar, B., Ponnusamy, S., Giri, D., Thuraisingham, B., Clifton, C.W., Carminati, B. (eds) *Mathematics and Computing. ICMC 2022. Springer Proceedings in Mathematics & Statistics*, vol 415. Springer, Singapore.

INVITED TALKS /KEYNOTE LECTURES

- **Diptiranjana Behera**, Department of Basic Science and Humanities, Radhakrishna Institute of Technology and Engineering, Bhubaneswar, Odisha, India, 7th June, 2023.
 - **Title:** *Applications of Mathematics in Professional Courses*
- **Mahesha Narayana**, 2nd International Conference (virtual) on Applied Mathematics and Computational Sciences (ICAMCS-2022) during October 12–14, 2022 organized by DIT University, Dehradun, India.

- **Title:** *On the comparative study of gravity modulated Rayleigh-Bénard convection involving free-free, rigid-free, and rigid-rigid boundaries*
- **Mahesha Narayana**, Christ University, Bengaluru, India during 9–14, January 2023, International Workshop on “Non-linear Stability of Thermoconvective Flows.
- **Mahesha Narayana** “Boundary Effects on Gravity-Modulated Rayleigh-Bernard Convection” at the Intentional Conference on Recent Advances in Fluid Mechanics and Nanoelectronics (ICRAFNMN-2023) held at Manipal Institute of Technology, Bengaluru, India during 12–14, July 2023.
- **Nagarani Ponakala**, International Conference on Recent Developments in Mathematics (ICRDM 2022) August 24–26, 2022 Online/Hybrid Canadian University Dubai, UAE.
 - **Title:** *Mathematical Modelling of flow and solute transport in Physiological Systems*
- **Victor Job**, International Workshop on Applicable Mathematics for Science and Engineering Recent Advances (AMSE-2023) February 16–20, 2023 (Online mode), Department of Mathematics, VIT-AP University, Andhra Pradesh, India.
 - **Title:** *The Penalty Finite Element Method and Applications to Convective Heat Transfer in Nanofluids.*
- **Victor Job**, Online Short-Term Course on Mathematical Modelling and Numerical Simulation (MMNS 2023) July 24–28, 2023, Department of Mathematics, Dr. B. R. Ambedkar National Institute of Technology, Jalandhar, India.
 - **Title:** *Mixed Finite Element Methods and Numerical Computation for Convective Ferrofluid Flows.*
- **Victor Job**, International Workshop on Applicable Mathematics for Science and Engineering Recent Advances (AMSE-2023) February 16–20, 2023 (Online mode), Department of Mathematics, VIT-AP University, Andhra Pradesh, India.
 - **Title:** *The Penalty Finite Element Method and Applications to Convective Heat Transfer in Nanofluids.*
- **Victor Job**, International Conference on Recent Advances in Applied Mathematics (RAAM 2023) June 20–22, 2023 (Online Talk), BITS Pilani Dubai Campus, United Arab Emirates.
 - **Title:** *Numerical Analysis on Breast Cancer Treatment via Intratumoural Injection of Nanoparticles*

CONFERENCE PRESENTATIONS

- **Nagarani Ponakala , Victor M. Job** and Sreedhara Rao Gunakala “*Finite Element Analysis of Unsteady Dispersion in Casson Fluid Flow*”, International Conference on Recent Developments in Mathematics (ICRDM 2022) August 24–26, 2022 Online/Hybrid Canadian University Dubai, UAE
- **Nagarani Ponakala and Victor M. Job** “*Peristalsis and Taylor Dispersion of Solute In The Flow Of Casson Fluid*, International Conference on Recent Developments in Mathematics (ICRDM 2022) August 24–26, 2022 Online/Hybrid Canadian University Dubai, UAE
- **Victor M. Job**, S. Rao Gunakala, “Unsteady Two-Phase Hydromagnetic Convection Flow of Aqueous Hybrid Alumina-Silver Nanofluid in a Wavy-Walled Enclosure with a Heat-Generating Rotating Cylinder”, International Conference on Modelling, Simulation and Optimization of Energy Systems (MSOES 2023) June 17–18, 2023. Online/Hybrid mode. Canadian University Dubai, United Arab Emirates.
- **Victor M. Job**, S. Rao Gunakala, A. Sankar, H.T. Basha, and S. Sreekanth, “Investigation of peristaltic and radioactive MHD Nanofluid flows in a flexible tube with porous inner player using the finite element method”, International Conference on Applied Research and Engineering (ICARAE 2022) November 18–20, 2022. Online/Hybrid mode. Cape Peninsula University of Technology, South Africa.
- **Tamika Royal-Thomas**. “Emerging Trends in Data Utilising Longitudinal Analysis”. Oral Presentation on August 12, 2022 at the FORECAST Conference 2022.

Conference/Workshop Participation

- **Ajani Ausaru** attended the Technological and Pedagogical University’s 17th National and 5th Internacional Conference in Tunja, Colombia held October 26–28, 2022. An oral presentation was made titled, “*Solutal Dispersion in a tube with Mild Stenosis*”.
- **Roxanne Francis** participated in an international workshop on Non-Linear Stability of Thermoconvective Flows in Bangalore, India. January 9–14, 2023

Department Seminars

- **Mr. Andre Small, Ph.D student** presented on “*Ellis Fluid Flow in a Finite Length Tube Driven by Peristalsis*” September 23, 2022
- **Mr. Derek Osborne**, Partner and Senior Actuary in the international practice of Life Works presented on “*Recent changes to Barbados’ NIS programme*” October 28th via Zoom

- **Dr. Robinson Julian Serna Vanegas** from Pedagogical and Technological University of Colombia presented on, “*A Link Between Representations of Peak Posets and Cluster Algebras*” October 21, 2022 via Zoom
- **Dr. Letetia Addison** from UWI, St. Augustine Campus in collaboration with **Mr. Kevan Rajara** PhD student at UWI, St. Augustine presented on, “*Natural Disaster Risk Classification using Machine Learning*” October 14 via Zoom
- **Dr. Anand Rampadarath**, Senior Bioinformatics Engineer at Plant and Food Research, New Zealand presented on, “***Reproducibility, curation and standards in Biomedical Modelling***” October 7th via Zoom
- **Mr. Mahesha Narayana** presented on, “*How to handle non-linear problems in a simple way?*” on Friday, November 18, 2022
- **Mr. Victor Job** presented on, “*In-Silico Modelling of Magnetic Nanoparticle Hyperthermia for Cancer Therapy*” on Friday, November 25, 2022
- **Dr. Pérez-Cañedos** presented on, “*Context Modeling in Optimization and Decision-Making Using Fuzzy Propositions*” via Zoom
- **Ms. Roxanne Francis** presented on, “*Gravity-modulated Rayleigh-B’enard convection in a Newtonian liquid bounded by rigid-free boundaries: A comparative study with other boundary conditions*” February 24, 2023.
- **Dr. İsmail Aydoğdu**, presented on, “*A Brief Introduction to Coding Theory*”. March 3, 2023 via Zoom
- **Mr. Dujon Dunn**, presented on, “*Solving differential equations using artificial neural networks*”. March 10, 2023 via Zoom.

PUBLIC SERVICE

For the 2022/2023 academic year, members of Department provided by the following public services to impact society as follows:

Diptranjan Behera

- Reviewed articles for Journal of Computational and Applied Mathematics (Elsevier), Journal of Mathematics (Hindawi), *Journal of Vibration Engineering & Technologies* (Springer).
- Joined as an Editorial board member for Journal of Soft Computing and Artificial Intelligence published by Dergi Park Akademik.
- International Program Committee Members of 5th International Conference on Signal Processing and Artificial Intelligence (ASPAI’ 2021), June 7–9, 2023, Tenerife (Canary Islands), Spain;
- International Program Committee Members of 5th International Conference on Signal Processing and Artificial Intelligence (ASPAI’ 2021), June 7–9, 2023, Tenerife (Canary Islands), Spain;

- Technical Program committee member of 13th International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering (QR2MSE 2023), July 26–29, 2023, Kunming, Yunnan, China;
- Technical Program committee member of 13th International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering (QR2MSE 2023), July 26–29, 2023, Kunming, Yunnan, China;

Mahesha Narayana

- Adjudicated a thesis entitled “Some studies on the influence of variable viscosity, couple stress fluid, and slip-velocity on the lubrication characteristics of the finite journal bearing” submitted by Tyrone Dass to The University of the West Indies, St. Augustine Campus, Trinidad and Tobago.
- Adjudicated a thesis entitled “Hydromagnetic pulsating flow of third grade nanofluid” for School of Advanced Sciences, VIT University, Vellore, India.

Nagarani Ponakala

- Reviewed an article for the Journal of the Indian Chemical Society, Proceedings of the Royal Society A; Scientific Reports; Physics of fluids.
- Technical Program Chair for International Conference on Modeling, Simulation and Optimization of Energy Systems (MSOES 2023) during June 17–18, 2023, at Canadian University Dubai, UAE.
- International Advisory Committee member for international conference on recent Advances in Fluid Mechanics and Nanoelectronics (ICRAFMN), Organized by Manipal Institute of Technology Bengaluru, in association with National Institute of Technology, Uttarakhand, July 12–14, 2023.
- Technical Program Committee member for International Conference on Recent Developments in Mathematics (ICRDM 2022) August 24–26, 2022 Online/Hybrid Canadian University Dubai, UAE.

Tamika Royal-Thomas

- Reviewed a paper for the *West Indian Medical Journal*. May 2023

Victor Job

- Reviewed articles for the journals, Journal of Magnetism and Magnetic Materials, Mathematics, Energies (MDPI), Journal of Porous Media, Coatings.

AGILITY

INCOME GENERATION

Despite the pandemic, the Department continued to offer Summer School this year to assist with our students' transition. Thirty-three courses ranging from preliminary to final year were offered by the Department from which over J\$7 million was earned. The students expressed their sincere thanks to the Department for the assistance given to their transition. The Department also received approximately J\$1.986 million in earnings from our self-finance programme MSc Enterprise Risk Management which is administered jointly with MSBM.