

# **WOMEN IN**

**SCIENCE,**

**TECHNOLOGY,**

**ENGINEERING &**

**MATHEMATICS**

## **WHAT IS STEM?**

**SCIENCE,**

**TECHNOLOGY,**

**ENGINEERING &**

**MATHEMATICS**

- STEM is an acronym for Science, Technology, Engineering and Mathematics education
- STEM is a curriculum based on the idea of educating students in four specific disciplines — science, technology, engineering and mathematics — in an interdisciplinary and applied approach.

Rather than teach the four disciplines as separate and discrete subjects, STEM integrates them into a cohesive learning paradigm based on real-world applications.

- STEM skills are increasingly necessary to engage in a knowledge-based economy. There is solid evidence to suggest that the fastest-growing and highest-wage jobs in future years will be in STEM fields and all employees will need to utilize STEM skills for problem solving in a wide range of industries.
- There are dramatic achievement and opportunity gaps between African-American and Latino students compared to their White and Asian-American counterparts in STEM.
- **Girls and women remain underrepresented and marginalized in most STEM academic fields and careers; hence the particular focus of this display to sensitize the university community on this very important issue.**
- Though the US has historically been a leader in these fields, fewer students have been focusing on these topics recently. Only 16 percent of high school students in the US are interested in a STEM career and have proven a proficiency in mathematics.
- In Jamaica, UTech and UWI are the two leading institutions offering STEM programmes at the university level. For the following academic years STEM graduates accounted for:

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Year	UWI	UTech
2008/09	11.30%	50.20%
2009/10	11.60%	32.70%
2010/11	13.70%	46.10%

- Additionally, between 2009-2011 the number of non-STEM professionals in Jamaica more than tripled the number of STEM professionals:

Year	STEM Prof	Non-STEM Prof
2009	1963	10120
2010	2270	10617
2011	1963	12545

- The Obama administration's 2014 budget invested \$3.1 billion in federal programs on STEM education, with an increase of 6.7 percent over 2012. The investments will be made to recruit and support STEM teachers, as well as support STEM-focused high schools with STEM Innovation Networks.
- All of this effort is to meet a need. Projections estimate the need for 8.65 million workers in STEM-related jobs in the US. The manufacturing sector faces an alarmingly large shortage of employees with the necessary skills — nearly 600,000. The field of cloud computing alone would have created 1.7 million jobs between 2011 and 2015.
- By 2018, the bulk of STEM careers in the US will be:
  - ✓ Computing – 71 percent
  - ✓ Traditional Engineering – 16 percent
  - ✓ Physical Sciences – 7 percent
  - ✓ Life Sciences – 4 percent
  - ✓ Mathematics – 2 percent



## PROF. YVETTE A. JACKSON

- Professor of Organic Chemistry & Pro Vice Chancellor, Graduate Studies. The focus of her work has been on how molecules in general interact with each other to produce new ones. Her current research interests include work on the synthesis and chemistry of rotenoids, important commercial insecticides of plant origin. Some of these are attractive for their potential insecticidal, pharmacological, anti-HIV, and general antiviral and antimicrobial activity.
- Her work on a project sponsored by J. Wray and Nephew led to the first study of factors which influence the maturation of Jamaican rum. Another research project, sponsored by the Petroleum Corporation of Jamaica, involved the production of sorghum syrup from local sorghum. Various process parameters were investigated and this has led to the establishment of a technically and economically feasible process for commercial production of table syrup from locally grown sweet sorghum. Her work has therefore minimized the guess work in the formulation of traditional Caribbean products and introduced predictive strategies for the physical behaviour of key ingredients in these products.
- She is the 2009 co-recipient of the UWI Mona award for: “The Best Research Project”: *The Iodine-Mediated Cyclisation of Thiobenzamides to Produce Benzothiazoles and Benzoxazoles.*
- She also served as Postdoctoral Research Fellow in the Department of Chemistry at the University of Alabama in Tuscaloosa, USA. Professor Jackson has over 30 publications which have appeared in some of the best journals in the chemistry scholastic business.



## PROF. PAULA TENNANT

Professor Tennant is a Research Plant Pathologist working with plant virus diseases in the Department of Life Sciences. Her work involves the identification of viruses of vegetables and fruit crops with an emphasis toward developing management strategies using Biotechnology as well as natural sources of tolerance or resistance from diverse germplasm, including domestic and wild species.

Her close collaboration with Cornell University (New York, USA), The Biotechnology Centre, UWI Mona, and the Jamaica Agricultural Development Foundation (JADF) has led to the establishment of the appropriate regulatory structures to oversee the use and importation of **agricultural biotechnology products in Jamaica and the development of virus resistant transgenic papaya.**

- She has co-edited several international scientific volumes in the area of Biotechnology; and has authored many scientific papers which appear in reputable, peer-reviewed journals. Her work is supported by external local and international grants.
- Consequently, in 2010 she was recognized as one of the “The Most Outstanding Researcher” at the UWI Mona for her work in the area: “*Management of Plant Virus Diseases*”.



## DR. SIMONE A. M. B. MCCREATH

- Dr. Badal McCreath manages the Biochemistry Laboratory at the Natural Products Institute at UWI where she is designing a new cell culture laboratory. She was recognized for her work in designing a new cell culture laboratory to investigate the cancer-fighting properties of Jamaican natural compounds.
- She is one of five chemists presented with the Elsevier Foundation Award for Early Career Women Scientists in the Developing World for research that looks to nature for ways to address cancer, malaria and other medical problems. The chemists represented five regions of the developing world; Dr. Badal McCreath represented the Latin America and the Caribbean.
- Her interest is in screening Jamaican plant isolates for their potential properties to slow down block or prevent the carcinogenic process. "Our findings have so far identified several isolates that are more potent in reducing cancer cell viability as well as potentially safer than anti-cancer drugs now on the market," she said. "This research will pave the way for future research necessary for drug development and also the propagation and culture of novel Jamaican cancer and normal cells lines." Since cancer is the leading cause of death in Jamaica, such findings will prove useful in cancer treatment and prevention.



## DR. CAMILLE BOWEN-FORBES

- Dr. Bowen-Forbes is a lecturer in the department of chemistry.
- Her research interests include: bioassay-directed isolation and identification of phytochemicals from exotic Jamaican flora (in particular fruits) using antioxidant, anti-inflammatory, anticancer and other assays, and the exploration of the potential for application to the food, agricultural and pharmaceutical industries.
- She has for the last two years been studying exotic or uncommon edible Jamaican fruits that grow wild, and conducting research into their health-beneficial properties and biologically active constituents.
- Her research has the potential to lead to the discovery of new plant sources that may be used in the treatment of disease, as well as the development of value-added food products of health benefit to consumers in Jamaica, the region, and beyond. This should contribute significantly to our food and agricultural industries and may also have a positive impact on the pharmaceutical industry.
- In 2007 she received the UWI Mona award for “Best research article”: *Jamaican Raspberry Fruit with Health-Beneficial Properties*.



## **PROF. THEJANI RUPIKA DELGODA**

- Rupika Delgoda is a Professor of Biochemical Pharmacology & Pharmacognosy and Director, of the Natural Products Institute. Her research interests include the evaluation of potential interactions of natural medicines with co-medicated pharmaceuticals (using drug metabolizing enzymatic molecular probes) and in parallel, the evaluation of Jamaican biodiversity in the treatment and prevention of cancer. Exploration of the value of natural products in other areas (overcoming resistance to pesticides in mosquitoes; psilocybin mushrooms) as well as in the preservation of traditional ethnomedical knowledge systems, rounds up her current research agenda.
- She holds a D.Phil. degree in Pharmacology from the University of Oxford, a post-doctoral research Fellowship in Biochemistry at the University of Leicester, and a first class honors degree in Chemistry from the University of Papua New Guinea.





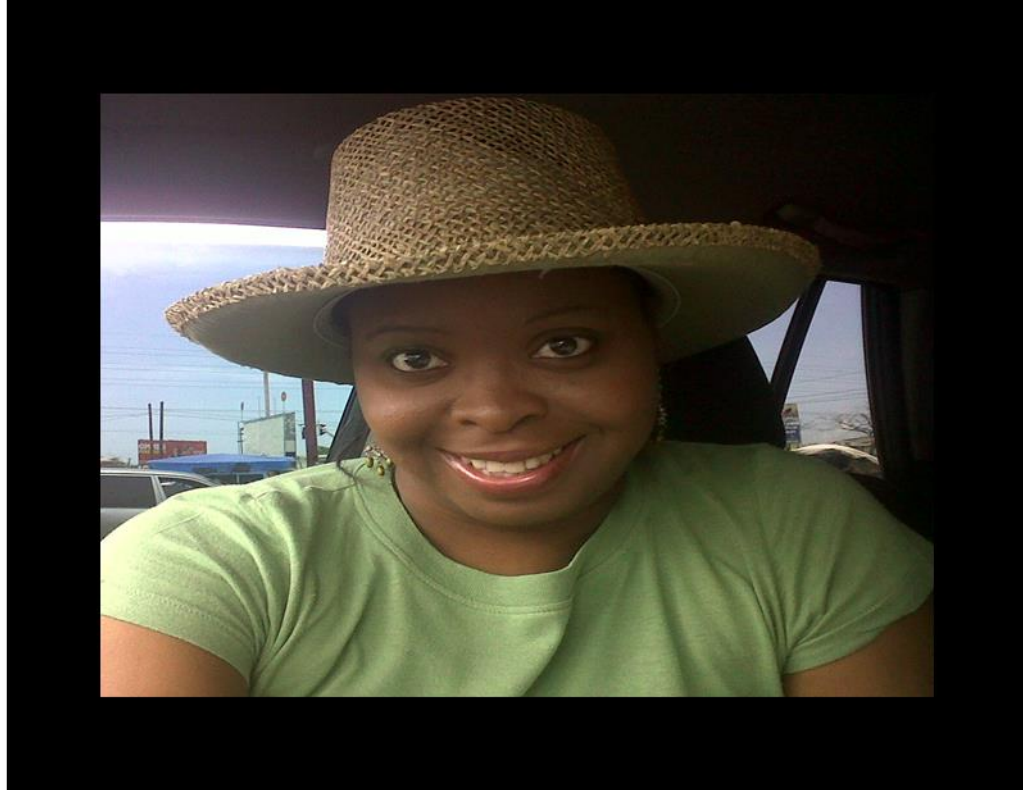
## DR. NADALE DOWNER-RILEY

- Dr. Downer-Riley is the 2009 co-recipient of the UWI Mona award for “The Best Research Project”: *The Iodine-Mediated Cyclisation of Thiobenzamides to Produce Benzothiazoles and Benzoxazoles*.
- Her research interests include: the synthesis of bioactive natural products from plants and marine microorganisms as well as the synthesis of heterocyclic molecules.



## DR. WINKLET GALLIMORE

- Dr. Gallimore's research interests include: the isolation and characterization of novel bioactive natural products from the marine and terrestrial environments leading to the development of linkages in industry to facilitate the commercialization of promising leads.
- Additionally, she conducts research in the identification of potential nutraceutical products from marine organisms.
- in 2012 with the paper: *Tracking Hypoglycins A and B over Different Maturity Stages: Implications for Detoxification of Ackee (Blighia sapida K.D. Koenig) Fruits* ( co-authored with Camille Bowen-Forbes; *Journal of Agricultural and Food Chemistry* 2011, 59(8), 3869-3875). The paper for the 2013 award was co-authored with Safiyyah Dundee.



## DR. SHERENE JAMES-WILLIAMSON

- Dr. James-Williamson is Lecturer and Museum Curator in the Department of Geography and Geology. Her primary area of research is sedimentology and stratigraphy. She has embarked on research projects centred around geoarchaeology where she is looking at building material such as mortar and how it can be used as a tool to inform technological and cultural provenance on historic buildings and structures. She is also involved in research into a classification and characterization of geo heritage sites in Jamaica.
- Dr. James-Williamson recently received a J\$1.5 Million New Initiative Grant from the UWI Mona to conduct research in **“Using Geological Provenance Techniques as a Tool for Determining Provenance of Building Material and Material Culture for Historical Sites and Monuments for Purposes of Disaster Preparedness and Management and Geoconservation”**.



## **DR. ARPITA MANDAL**

- Dr. Mandal is a Lecturer (Hydrogeology) in the Department of Geography and Geology.
- She is currently researching GIS based flood plain mapping and modeling of the Hope River Watershed, St. Andrew, Jamaica. This is a part of the WORLD BANK funded project on Caribbean Disaster Risk Atlas.
- Other research includes: creation of the flood inundation map for Port Maria, St Mary Jamaica, and a town which gets significantly flooded after a heavy rainfall following passage of tropical storm or hurricane. Research has also been done on the hydrochemistry of the groundwater wells of the Kingston basin, the most densely populated and polluted basin supplying water to the entire parishes of Kingston and St Andrew. Saline water intrusion studies involving DC (direct current) resistivity studies have also been carried out in the alluvium aquifer of St Catherine as another aspect of her research.
- Dr Mandal's research also aims to re-map the water resources of the island, to provide detailed geological and structural mapping of the aquifers to locate possible new sources of water bodies.
- She is a recipient of a grant from ODPEM to support research on flood modeling of Port Maria as well as from CARIBSAVE-CDKN for the Project titled "Climate Change and Inland Flooding in Jamaica, Risk and Adaptation Measures for Vulnerable Communities (CCRIF-RAVC)".



## DR. JUDITH MENDES

- Dr. Mendes, lectures in the Department of Life Sciences. She is the Director of the Bellairs Research Institute of McGill University in Barbados.
- She is a coral biologist, an avid SCUBA diver, and the Coordinator of the Creative project.
- In 2010 she was recognized for producing the “Research Project Attracting Most Research Funds”: Caribbean Reef Education & Training Initiative.



## DR. DONNA MINOTT KATES

- Dr. Minott Kates' research interests include: Characterisation of food and foodstuffs that have a uniquely Jamaican identity via examination of nutrients and antinutrients, flavour profile.
- Her research projects include: tracking hypoglycin variation in ackees; chemistry of Jamaican spices; essential oil and oleoresin composition; changes in metabolite profile; biological activity. Polycyclic aromatic hydrocarbons (PAHs) in Jamaican jerked meats.
- In 2013 she was one of the recipients for the UWI Mona Award "Best Research Publication": *Impact of Seed Size on Residual Hypoglycin Levels in Ackee*.
- She was also a recipient of the UWI Mona Best Research Publication in 2012 with the paper: *Tracking Hypoglycins A and B over Different Maturity Stages: Implications for Detoxification of Ackee (Blighia sapida K.D. Koenig) Fruits* ( co-authored with Camille Bowen-Forbes; *Journal of Agricultural and Food Chemistry* 2011, 59(8), 3869-3875). The paper for the 2013 award was co-authored with Safiyyah Dundee.



## DR. SYLVIA ADJOA MITCHELL

- Dr. Mitchell is the research leader of the Medicinal Plant Biotechnology Group, which she initiated in 1999 at The Biotechnology Centre, UWI. She is experienced in plant tissue culture (>35 years), ethnobotany (>22 years), and agri-biotechnology commercialization. Her working career includes seven years at the Scientific Research Council and two years at the Sugar Industry Research Institute tissue culture labs while she has been a member of staff at The Biotechnology Centre, UWI since 1999, where she presently is a Senior Lecturer.

Holding a double major degree in Geography / Botany and a PhD in Biotechnology from UWI, her focus is in providing biotechnology solutions to farmers throughout Jamaica and the Caribbean by developing micropropagation protocols, biofarming solutions, determining bioactivity of plant extracts, producing monographs, testing soil ameliorants such as biochar, and undertaking field studies. She has over 40 publications in books, book-chapter, technical reports and refereed journals plus hundreds of other types of articles.

- She believes the Caribbean can harness the potential of its local plant biodiversity for sustainable production of food, herbs, spices, medicine, aromatherapy, furniture, and biofuels through the judicious use of biotechnology, a goal towards which she is diligently working.
- Dr Mitchell was named as one of the 70+ UWI Women of Distinction in February 2019. She has been married to Alson Mitchell for 35 years and the union has been blessed with six wonderful children. She is presently a member of the Sustainable Rural and Agricultural Development (SRAD) cluster, SALISES, UWI; the Bamboo Industry Association of Jamaica (BIAJ), the Bamboo and Indigenous Material Products Standards Technical Committee (BIMPSTC) and also serves as Co-Editor of In Vitro Reports for the Society for *In Vitro* Biology.







## **PROF. MARCIA ROYE**

- Professor Roye is a Senior Lecturer in Biotechnology. She is one of a group of just 20 women who received the L’Oreal-UNESCO International Fellowship Grant.
- She is also the first Jamaican to have received the L’Oreal-UNESCO International Fellowship (in 2000), and among an exclusive group of approximately 1,100 female scientists from 103 countries worldwide to have been distinguished by Awards or supported in the pursuit of their career through the L’OREAL-UNESCO Women in Science partnership.
- Research conducted by Professor Roye has resulted in the identification of numerous plant viruses, and has played an integral role in the development of strategies to control them.
- Locally, her work has resulted in the identification of more than 24 viruses associated with plants such as red pea, broad bean, tomato, scotch bonnet pepper, cabbage and common weeds. Her research has been instrumental in facilitating the control of viruses in two crops by cultivation of resistant varieties of tomato and cabbage. This has enabled the local agriculture market to flourish, as these plant viruses can cause significant yield loss.
- Professor Roye’s research in viruses has expanded to humans, as she has now embarked on research in the detection of antiretroviral (ARV) drug resistance of HIV in Jamaican patients. The research serves to improve ARV treatment and outcome for HIV-affected individuals as well as the quality of life of HIV patients.



## **DR. NOVLETTE SADLER MCKNIGHT**

- Dr. Saddler McKnight's research interests include: (a) Mechanisms of inorganic and organometallic reactions: Synthesis and reactivity of molybdenum and ruthenium complexes and their applications as catalysts, models for enzymes and participants in atom-transfer reactions. (b) Chemical Education: To design and validate instruments to measure different dimensions of student learning, both cognitive and affective and to implement innovative strategies that that will allow for a better understanding of how to improve instruction in chemistry, especially against the background of the changing demographics and learning styles of university students.
- Her current projects focus on Peer Led Team Learning, the use of the Science Writing Heuristic approach in undergraduate laboratory, and understanding the science culture nexus in schools.



## DR. MARVADEEN SINGH-WILMOT

- Dr. Singh-Wilmot is a lecturer in Inorganic Chemistry and Crystallography.
- She has published on a variety of new lanthanide containing molecules and still continues work on rare earth nanoclusters (multiple lanthanides in a cluster whose dimensions are in the nanometer range). Most of her attention is currently focused on using lanthanides to assemble Metal Organic Framework Materials (MOFs).
- Dr. Singh-Wilmot served as co-chair of the Young Scientist Ambassador Program (YSAP) which is an initiative of The Young Scientists from the 2010 Annual Meeting of the New Champions (AMNC), Summer Davos. This program involves Young Scientists from 55 different countries representing every section on the Globe; it promotes the efforts of AMNC Young Scientists to bridge the international scientific gap by facilitating cultural, scientific, intellectual, or educational interactions.
- In October 2010 she was inducted as a Young Affiliate Fellow of the Academy of Sciences for the Developing World (TWAS) in Hyderabad India. She is the first Young Affiliate to be selected from the Caribbean Region.



## **DR. TANNECIA STEPHENSON**

- Dr. Stephenson is a senior lecturer and Head of the Department of Physics and a Co-Director of the Climate Studies Group, Mona.
- She was awarded the Bronze Musgrave Medal for Science 2014.
- During the period 2013-2020, she was a member of the Coordinated Regional Climate Downscaling Experiment (CORDEX) Science Advisory Team (CORDEX-SAT) of the the World Climate Research Programme (WCRP). She was appointed as a WCRP Regional Focal Point for the North and Central America and the Caribbean in 2020 and a member of the WCRP Climate and Ocean - Variability, Predictability and Change (CLIVAR) Atlantic Region Panel in 2021. She is also a lead author for the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
- Her research interests are Caribbean climate variability, climate change and impacts, climate extremes, seasonal predictions using statistical models and statistical downscaling. She has been affiliated with a number of climate variability and change projects and has published a number of journal articles, technical reports and short monograph with collaborators. Her work experience includes conducting research as a visiting fellow at the Climatic Research Unit at the University of East Anglia in the United Kingdom.

- Dr. Stephenson's work contribution will provide us with additional projections of how the climate of the Caribbean may change in the future and some of the possible impacts and the results will be one of the motivations for the decisions made by the international community on climate change mitigation and adaptation.



## DR. MONA WEBBER

- Dr. Webber is a Professor of Marine Biology.
- Her research has focused on Zooplankton: their community structure and distribution, and their use as indicators of water quality.
- She currently focuses on assessing marine habitat quality (water columns; mangroves; sea grasses) using novel indicators. Her work includes micro-plastic contamination in coastal areas (with focus on mangroves). She has also conducted studies on mangrove biodiversity.
- She has supervised various projects including graduate student work on the sponges of the Port Royal mangroves with the identification of a new species in the process
- In 2013 Dr. Webber was one of three lecturers appointed to the United Nations Pool of Experts to assist in the production of a World Ocean Assessment – the first integrated global assessment of the state of the marine environment, including socio-economic aspects.
- She has been a recipient of several Principal Research days awards from the UWI Mona, the most recent ones being (2020), Principal's Research Award- Best Publication, Article (Micro plastics in Kingston Harbour) with Deanna Rose (ICENS) and Principal's Research Award for Research Project with the Greatest Business/Economic/Development Impact: PROFOR- Mangrove project. Part of a team from Geography/Geology, ICENS and CMS (Patrice Francis and Camilo Trench).
- She was also honoured as one of the 70+ Outstanding UWI Women (one of the Mona campus group of 39), at an awards ceremony on February 14, 2019. A UWI 70<sup>th</sup> Anniversary initiative.



## DR. NAGARANI PONAKALA

- Dr. Ponakala is an Applied Mathematician working in the fields of Physiological Fluid Dynamics and Advanced Mathematical Methods since 1999. She is interested in Mathematical Modelling, simulation and studying the complex physiological situations while using advanced Mathematical methods to solve these models.
- She is a recipient of several awards includes Bharat Ratna Indira Gandhi gold medal award for outstanding individual achievement in Education and Research for 2019, by Global Economic Progress & Research Association (GEPRA), New Delhi, India; TWAS-CAS Young Scientist award for the year 2016 by The World Academy of Sciences (TWAS) and CAS (Caribbean Academy of sciences) Principal award for the best publication of the article entitled “Effect of boundary absorption on dispersion in Casson fluid flow in an annulus- Application to catheterized artery” from The University of the West Indies, Mona, Kingston, Jamaica for the year 2009-10.



## PROF. ALEXANDRA RODKINA

- Professor Rodkina works in the area of stability of the stochastic equations. She is a recipient of the UWI Mona 2009 Award for: “Most Outstanding Research Activity”: Stability for Stochastic Equations.
- For the last 25 years she has been the reviewer of Zentralblatt fur Mathematik - Mathematics Abstracts.
- She is also a reviewer of international mathematical journals such as: “Stochastic and Stochastic Reports”, “Dynamics of Discrete and Continuous Systems”, Journal of Applied Mathematics and Stochastic Analysis”, Functional-Differential Equations”, “Stochastics”, and “Applied Mathematics E-Notes”.
- She is also a member of the editorial board of “International Journal on Difference Equations”.





## **PROF. HELEN N. ASEMOTA**

- Professor Asemota was appointed Director of the Biotechnology Centre on August 1, 2013. She has served UWI for more than two decades and has lectured for over 30 years in different parts of the world. She also served as an International Biotechnology Consultant to the United Nations Food and Agriculture Organization.
- Professor Asemota's work is pivotal to yam research, application of new biotechnologies to crop production, and improvement and exploitation for sustainable development in Jamaica for yam production, and in different parts of the world for yam, potato, dasheen, and cocoa.
- She is noted for leading large international multi-disciplinary grants for technology transfer and has served PI roles in USA National Institute of Health (NIH) and National Science Foundation (NSF) grants.
- Professor Asemota is a renowned biomedical research expert in experimental diabetes, hypercholesterolemia, health disparities, and cancer research and bioactive phyto-materials and by products. With some 300 publications, Professor Asemota also has 4 patents from her research.



## **DR. CLAUDINE ALLEN**

- Dr. Allen is a lecturer in the Department of Computing.
- Her particular interest is in the development of discrete reusable entities called learning objects. The idea behind learning objects comes from the object oriented programming paradigm. She focuses on the development of taxonomies particularly suited for repositories in the typical secondary and tertiary school environment as well as the development of component architectures.



## DR. GUNJAN MANSINGH

- Gunjan Mansingh is a Senior Lecturer at the Department of Computing, The University of the West Indies (U.W.I), Mona, Jamaica.
- She holds a PhD in Information Systems and she teaches various courses at the undergraduate and the graduate level in Computer Science and Information Systems including Business Intelligence, Programming, Artificial Intelligence and Knowledge Discovery and Analytics.
- She is a co-author of the book “Business Intelligence for SMEs: An Agile Roadmap for Sustainability.” She is a co-editor of an edited book titled “Knowledge Management for Development: Domains, Strategies and Technologies for Developing Countries”, Springer Integrated Series in Information Systems. She also serves on the international editorial review board of International Journal of Knowledge Management. Her research interests are in the following areas; Business Intelligence, Data Mining, Machine Learning, Decision Support Systems, Expert Systems. Knowledge Management and Knowledge Management Systems, and Technology Adoption. In her research she has worked in different domains in Jamaica such as healthcare, crime, agriculture, e-commerce and financial services. Her research focus has been on harnessing data, information and knowledge in the various sources to assist in the decision making process. She has over 50 publications in international journals, proceedings of several international conferences and as book chapters.

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