Annual Report 2023-2024

DEPARTMENT OF MATHEMATICAL SCIENCES

Submitted by:
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Director

Table of Contents

I. General Information of the Mathematic Department

A. MISSION AND VISION

The mission of the Department of Mathematical Sciences is to:

- To offer undergraduate and graduate programs of excellence in Mathematics (Pure and Applied), Statistics, Mathematics Education, and Computer Science.
- To promote research in the areas mentioned above.
- To promote interdepartmental and inter-university collaboration projects, both nationally and internationally.
- To promote teacher and student training projects to improve knowledge of mathematical sciences in Puerto Rico.
- Offer service courses to other academic programs of the RUM and advice in computing, statistics and mathematics to the community.

The vision of the Department of Mathematical Sciences consists of:

- To provide a high-quality education for all students.
- To promote the development of research and the wide dissemination of mathematics, statistics, education, computer science and other related areas.
- Maintain effective links that promote the development of the industry and the community in general.

II. Organizational Structure

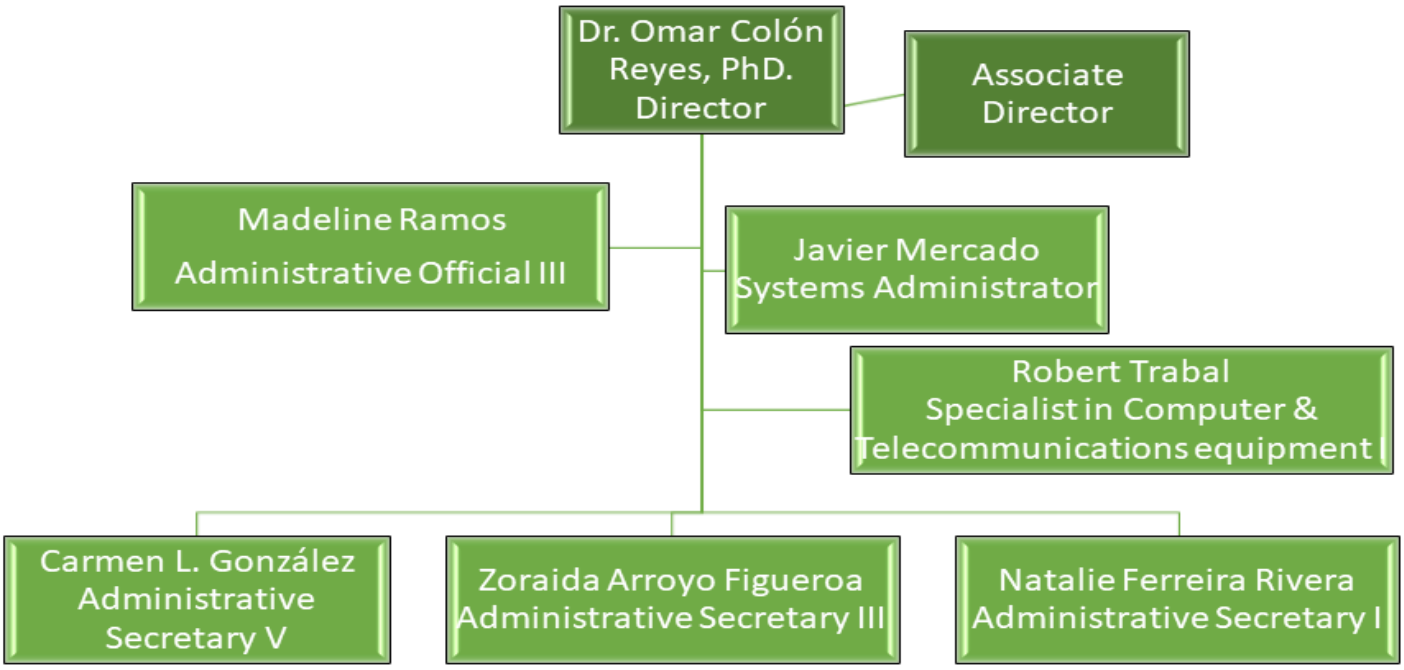
i. Organizational Chart of the Mathematic Department

The Department of Mathematical Sciences offers a wide variety of study programs, both at the undergraduate and graduate levels. These programs are:

- Undergraduates: Bachelor's Degrees in Pure Mathematics, Computer Science and Mathematics Education.
- Graduates: Master's degrees in Applied Mathematics, Pure Mathematics, Computer Sciences, Mathematical Statistics, and Mathematics Teaching at Pre-University Level. PhD in Information and Computer Science and Engineering (CISE).

The Department of Mathematical Sciences has a staff of 26 professors in the specialties of Applied Mathematics, Computer Science, Mathematics Education, Pure Mathematics, Computer Sciences and Statistics. It also has 57 graduate students from different countries: Puerto Rico, Colombia, Honduras, El Salvador and Costa Rica.

The math department administrative staff consists of a director, an associate director, an administrative officer, 3 secretaries, a systems coordinator and a user services technician.



II. **Report on initiatives, activities and achievements in accordance with the Strategic Plan**

A. EXECUTIVE SUMMARY

The Department of Mathematical Sciences at the University of Puerto Rico at Mayagüez (UPRM) plays a vital role in advancing education, research, and innovation within the university community and beyond. Our commitment to excellence in teaching, research, and service positions us as a leader in mathematics education and scholarship in Puerto Rico.

Current Challenges: Despite our department's reputation for academic excellence, we face significant challenges that hinder our ability to fully realize our potential and impact. These challenges include outdated infrastructure, inadequate resources, and limited opportunities for faculty and student engagement.

Vision for Improvement: To address these challenges and maximize our impact on Puerto Rican society, we propose a comprehensive plan to strengthen the Math Department. This plan focuses on several key areas:

1. **Infrastructure Enhancement:** We will prioritize the renovation and modernization of our departmental facilities to create a dynamic and conducive learning environment. This includes upgrading classrooms, laboratories, and computing resources to meet the evolving needs of our students and faculty. Moreover, starting August 2024, the department of mathematical sciences would start in a new building, Monzon Building.
2. **Curricular Innovation:** We will develop innovative and interdisciplinary mathematics programs that align with the demands of the 21st-century workforce. By integrating real-world applications, experiential learning opportunities, and collaborative projects, we will equip our students with the skills and knowledge needed to succeed in diverse fields**.**
3. **Research Excellence:** We will invest in faculty research initiatives and provide support for student research opportunities. By fostering a culture of inquiry and discovery, we will advance knowledge in mathematical sciences and contribute to solving complex societal challenges.
4. **Community Engagement:** We will actively engage with local communities through outreach programs, educational initiatives, and collaborative partnerships. By promoting math literacy, STEM education, and social impact projects, we will empower individuals and promote positive change throughout Puerto Rican society. Examples are OMPR, OiPR, COMATEQ, and Copa Eugene Francis.

Impact and Outcomes: Through these strategic initiatives, we aim to position the Math Department as a driving force for societal impact in Puerto Rico. By enhancing our infrastructure, curriculum,

research, and community engagement efforts, we will empower individuals, foster innovation, and contribute to the economic, social, and cultural development of our island.

The Math Department at UPRM is committed to excellence, innovation, and service. By investing in our department's growth and impact, we will continue to uphold our legacy of academic excellence and leadership in mathematics education and scholarship, driving positive change for Puerto Rican society and beyond.

B. OBJECTIVE I: TO INSTITUTIONALIZE A CULTURE OF STRATEGIC PLANNING AND ASSESSMENT

Establishing a culture of strategic planning and assessment within the Mathematics Department at the University of Puerto Rico at Mayagüez (UPRM) is critical for improving our educational, research, and outreach efforts. By integrating strategic planning processes and assessment mechanisms into our departmental operations, we can enhance our effectiveness, responsiveness, and impact.

Here's how the Math Department executes the objective 1:

The Math Department looks to promote and combine a collaborative and systematic approach that guarantees that our educational and administrative practices are aligned with institutional goals, promoting the comprehensive development of our students and the professional growth of our staff. It is expected that the Math Department can improve academic performance and can respond to educational challenges, creating a dynamic and continuous learning environment.

The department's five-year program reports were completed:

2. Curricular sequence in Applied Mathematics for Sciences and Engineering
3. Curricular sequence in Pure Mathematics
4. Curricular sequence in Statistics and Probability
5. Masters in Applied Mathematics
6. Master of Science in Pure Mathematics
7. Master in Statistics

COLLOQUIUM Departmental

A group of conferences by prestigious members of the national and international mathematical community, whose purpose is to promote professional improvement among professors, graduate students and undergraduate students, as well as to encourage inter-university collaboration at all levels.

Interuniversity Seminar on Mathematics Research

Description: SIDIM is an international academic activity where the latest research in Mathematics (Pure Mathematics, Applied Mathematics, Mathematics Education, and Computer Science) is

presented. This seminar was proved in the RUM and celebrated its XXXVIII edition. The following year's venue is selected at the closing meeting of the year in which it is held. The venue can be requested by public and private universities in Puerto Rico. The Steering Committee organizes the activity and selects the plenary speakers. Recurring lectures, as well as poster presentations, are by registration. Because of the important level of activity, it is aimed at professors, graduate students, and undergraduate students recommended by a faculty member of the department.

Awarding of the Gauss Medal

Annual award given by the department to the best averages in its high school programs.

Pre-Calculus and Calculus Competencies

Professors in charge: Dr. Reyes M. Ortiz and Dr. Pedro Vásquez.
Place and Date: Business Building, Thursday, March 14, 2024.
Academic activity of public and private school students on the island, where it looks to promote mathematical culture among future university students.

COMATEQ International Competition 2024
8th edition- March 2, 2024

ENCOURAGE RESEARCH AMONG UNDERGRADUATE AND GRADUATE STUDENTS

ORAL PRESENTATIONS

- Ordoñez, Claudia P.- Poster Presentation: Elliptical EDP Approximation with Refinement in Finite Differences, SACNAS 2023 National Diversity in Stem Conference NDiSTEM, October 26-28, 2023, Portland Oregon

- Flórez, Juan E.- Present Thesis Work, SACNAS 2023 National Diversity in Stem Conference NDiSTEM, October 26-28, 2023, Portland Oregon

- Arauz Aguilar, Junior-Present proposal: "Techno didactics for the teaching of limits of a variable with artificial intelligence." XIII International Congress on Computer-Assisted Mathematics Teaching, December 7-11, 2023, San José, Costa Rica

- Arauz Aguilar, Junior- Poster Presentation, SACNAS 2023 National Diversity in Stem Conference NDiSTEM, October 26-28, 2023, Portland Oregon

ACTIVITIES

Infomate July 10 to 18, 2023
Mathematics Diagnostic Exam- July 22, 2023
XXV Central American and Caribbean Mathematical Olympiad (OMCC 2023)-July 23 to 29, 2023
Welcome Activity **for Undergraduate Students**- August 4, 2024, 8:00 am, FA.
Graduate Student Welcome **Activity**- August 7, 2023, 10:00 am-12:00 md, SH-209
P R Math Olympiad 2022-2023, September 5-6, 2023, San Juan PR
Precalculus Mock Exams- September 12 & 14, 2023, FB/Physics, Nursing
Pre-Calculus Mock Exams- October 10 & 12, 2023, FB/Physics, Nursing
2nd Phase **OMPR (Puerto Rico Mathematical Olympiads) Cycle 2023-2024**, Saturday, November 4, 2023, Business Administration
Institutional Open House Arts and Sciences, Friday, November 10, 2023, Chardón Squares and lobby
Infomate- October 4 to December 2, 2023
International Graduate Student Dinner- Monday, November 20, 2023, 5:00 pm, The Mezzanine
Fraternization of incoming undergraduate students, active students, faculty, and department administrative staff, Thursday, November 30, 2023, 10:30 am, FB Physics Amphitheater
Diagnostic Exam- Wednesday, December 6, 2023
Tour and visit to the remodeled Monzón Building in the company of the Rector, December 14, 2023, 9:00 am

Welcome and Orientation of Graduate Students of Mathematical Sciences, Monday, January 15, 2024, FB Amphitheater
Bebras PR 2023
Scratch Jam PR 2024- January 22, 2024
Saturday PMR, February to April 2024, Business Administration
SIDIM-UPR Humacao, March 1 and 2, 2024
Pre-Calculus and Calculus Competitions, Thursday, March 14, 2024, 8:30 am-4:00 pm, Business Administration/ El Mezzanine Room
Diagnostic Exam - Saturday, March 23, 2024
Awards ceremony for the second phase of the Puerto Rico Olympics 2023-2024 Cycle, Saturday, April 6, 2024, 12:00- 5:00 pm. Rafael Mangual Coliseum.
Special Guest: Dr. Marcos Berríos, NASA Astronaut
Third phase of the Puerto Rico Olympics 2023-2024 Cycle- Saturday, April 6, 2024, 9:00 am-12:00 md, Business Building
Fourth phase of the Puerto Rico Olympics 2023-2024 Cycle- April 20 to 21, 2024, UPR Río Piedras
"Honor Roll" Activity for Undergraduate and Graduate Students, Wednesday, April 10, 2024, 4:30 pm-10:00 pm, Tarzan
Infomate- Room- Friday, April 12 to Saturday, May 4, 2024
Diagnostic Exam- Saturday, April 13, 2024
Eugene A. Francis Cup, Saturday, May 4, 2024, Tarzan Room
Infomate Scholarship - Monday, June 3 to Tuesday, June 11, 2024
Infomate Non-Granted- Monday, June 17, 2024, to Wednesday, June 26, 2024
Diagnostic Exam- Wednesday, June 26 to Saturday, June 29, 2024
24th OMPR Summer Camp for Math Talent Students, June 20-23, 2024, CROEM (Mayagüez Residential Center for Educational Opportunities), Mayagüez
OII-Peru- IberoAmerican Computer Science Olympiad- June 22-23,2024
Arts & Sciences Summer Camp, June 24, 2024, 11:00 a.m.-3:00 p.m., Nursing Amphitheater

COLLOQUIUM

Virtual- Dr. Jack Calcut, Oberlin College, Title: “Visual Proofs,” October 3, 2023, 10:30 am, link: http://meet.google.com/urm-rhmx-dwh

Virtual- Dr. Donald Hoffman, UC Irvine, Title: “Dynamics Beyond Spacetime,” November 14, 2023, 10:30 am
link: http://meet.google.com/urm-rhmx-dwh

Virtual- Dra. Ivelisse Rubio Canabal, UPR Rio Piedras, Title: “Extension of the covering method to any finite field,” November 28, 2023, 10:30 am, link: http://meet.google.com/urm-rhmx-dwh

Presencial- Dr. Pablo V. Negron, UPR-Utuado, Title: “Deformations of rotating disks and spheres under self-gravitation,” December 7, 2023, 10:30 am, Paredón de Celis C-116

Presencial- Dr.Emmanuel J. Morales Butler, UPR-Utuado, Title: “Identifying Outliers in Radio Astronomy Data Using the Generalized Spectral Kurtosis Estimator,” December 12, 2023, 10:30 am, Anfiteatro FB

Face-to-face- Dr. Joaquín Rivera, UPR-Humacao, Title: "Exploring fractal and chaos theory in the narrative of Jorge Luis Borges, February 13, 2024, 10:30 am, FB Amphitheater

Presencial- Dra. Ricela Feliciano & Dr. Kevin Palencia, Northern Illinois University, Title: “The student’s Eyes Lens to Inform our Math Teaching,” February 27, 2024, 10:30 am, Anfiteatro FB

Presencial- Dr. Jim Gleason, Dr. Ulysses Alvarez, Dr. Roberto Toro-Rodriguez and Mr. Angel Figueroa-Rosado, University of Alabama, Title: “Information session: Mathematics Education and Mathematics”,
febrero 29, 2024, 10:30 am, Celis 116

Presencial- Dr. Felix Pabón, Indiana University Title: “Information session: Biostatistics,” febrero 29,2024,
3:00 pm, Celis 116

Presencial- Dr.Gabriel Montoya, CUNY Graduate Center, Title: “An Introduction to the Mathematical Theory of Knots,” Marzo 5, 2024, 10:30 am, Anfiteatro FB

Virtual- Dra. Leyda Almodovar, Stonehill College, Title: “Mathematical Modeling of DNA Self-Assembly”,
marzo 7, 2024, 10:30 am, link: https://meet.google.com/ihb-ixao-sci

Virtual- Dr. Liliana Esquivel Mora, Universidad del Valle, Colombia, Title: "Analytic continuation method for the Benjamin-Ono equation", May 7, 2024, 10:30 am, link: https://meet.google.com/urm-rhmx-dhw

ACHIEVEMENTS AND AWARDS

1. **Visit of the Astronaut, Dr. Marcos Berrios**- The award ceremony of the OMPR 2023-2024 Olympic Cycle took place on Saturday, April 6, 2024, at the Rafael A. Mangual Coliseum. For this activity, the Department of Mathematics and OM.PR (Puerto Rico Mathematical Olympiads) was visited by Astronaut Marcos Berríos who showed that he was a participant in the Puerto Rico Mathematical Olympiad project, which helped him develop academic discipline and love for mathematics, science and engineering.

2. **Pre-Graduation Activity 13 MS students**- On Wednesday, April 17, 2024, the mathematics department conducted its Pre-graduation activity to undergraduate and graduate students of the department who completed their degree by May 2024. It is important to highlight the graduate students who will obtain their master's degree. Under the Graduate Program of Pure Mathematics, they complete 3 students. For the Graduate Program in Applied Mathematics 1 student completes. The Graduate Program in Statistical Mathematics has 2 students. The Graduate Program with the highest number of graduate students who complete a degree is the Science in Scientific Computing with 5 students and to finish the Graduate Program in the Teaching of Mathematics at the Pre-University Level 2 students complete it.

3. **Proposals and Publications-** The Department of Mathematics is proud to mention several professors who completed projects, accepted articles and published books. Among them:

- Dr. Karen Ríos: CIU: Implementation: Medium: Computational and Data Science Curriculum Exchange Faculty Community of Practice, for $999,607,000 from the NSF was approved. More information can be found at the following link: https://www.nsf.gov/awardsearch/showAward?AWD_ID=2400201&HistoricalAwards=false
- Dr. Roberto Rivera: Article was accepted: “A modeling approach of return and volatility of structured investment products with caps and floors.”
- Dr. Arturo Portnoy- Published book "*The Mathematics of Music and Art,"* Synthesis Lectures on Mathematics & Statistics, Springer Cham, 2023, The Mathematics of Music and Art | SpringerLink. Due to the great reception obtained by his book's publication, the department's faculty approved the creation of the course The Mathematics of Music and Art, and the request was submitted to the Dean of Arts and Sciences. Without a doubt, this course is designed as a universal and extremely attractive alternative for all disciplines.
- It was possible to obtain $50,000.00 through the Dean's Office of Students to offer the Pre-Calculus Tutoring Support Center for students who need it. This initiative is especially important because it eases the continuity of the services offered to students, which are the basic tool for passing these courses.

The Department of Mathematics is always at the forefront of what students are looking for in the programs offered semester after semester and we will continue to search for tools that revolutionize the academic excellence we offer.

C. OBJECTIVE 2: TO LEAD HIGHER EDUCATION THROUGHOUT PUERTO RICO WHILE GUARANTEEING THE BEST EDUCATION FOR OUR STUDENTS

To lead higher education throughout Puerto Rico while guaranteeing the best education for our students in the Mathematics Department at UPRM involves several key strategies and commitments that have been achieved:

Curriculum Enhancement: Continuously updating and improving the curriculum to align with global standards and emerging trends in mathematics education. This includes incorporating interdisciplinary approaches, modern technological tools, and real-world applications to ensure students are well-prepared for both academic and professional challenges.

Faculty Development: Investing in faculty training and development to foster excellence in teaching, research, and mentorship. This includes supporting faculty members in pursuing advanced degrees, attending conferences, and engaging in collaborative research projects that contribute to the advancement of mathematical knowledge.

Student Support Services: Implementing comprehensive support services that cater to the diverse needs of students. This includes academic advising, tutoring programs, career counseling, and opportunities for internships and research experiences that enhance learning outcomes and professional readiness.

Research and Innovation: Promoting a culture of research and innovation within the department, encouraging faculty and students to engage in innovative research that addresses significant mathematical challenges and contributes to the advancement of the field.

Community Engagement: Strengthening ties with the local community and industry partners to create opportunities for collaboration, internships, and outreach programs that promote the practical applications of mathematics and foster a sense of social responsibility among students.

Infrastructure and Resources: Ensuring that the department has advanced facilities, laboratories, and resources necessary to support teaching, research, and learning activities. This includes investing in technology upgrades and creating a conducive environment for academic excellence.

Continuous Improvement: Implementing a system of continuous assessment and improvement to check student learning outcomes, gather feedback that enhance the overall quality and effectiveness of the mathematics programs at UPRM.

By focusing on these key areas, the Mathematics Department at UPRM has effectively led higher education in Puerto Rico, ensuring that students receive the best possible education and are prepared to excel in their careers and contribute meaningfully to society.

D. OBJECTIVE 3: TO INCREASE AND DIVERSIFY THE INSTITUTIONS SOURCES OF REVENUE

The Department of Mathematical Sciences continues to seek external funding to supplement the budget given to it annually. Our faculty's participation in short, medium and long-term initiatives shows our commitment to academic, research and administrative excellence.

-Writing, proofreading and marketing of the books that are under our department and that are used for the basic courses. The faculty of our department is recognized nationally and internationally for their achievements and contributions in academia and research. Given this experience and the constant increase in the cost of student books, our department took the initiative to draft the following books: MATE 3171 Text and Exercise Manual (Precalculus I), MATE 3172 Text and Exercise Manual (Precalculus II), MATE 3086 Text (Mathematical Reasoning). This initiative, in addition to lowering the cost of textbooks, provides income to the department to be used in initiatives with a direct impact on students, academia and research.

-Institute of Mathematical Strengthening (INFOMATE), which is generating income because students have recognized its importance in reviewing the topics required to pass the Mathematics Diagnostic Exam.

All these revenues are used to pay for impact services to teaching, research, and the administrative processes supporting them.

E. OBJECTIVE 4: TO IMPLEMENT EFFICIENT AND EXPEDIENT ADMINISTRATIVE PROCEDURES

- Initiatives continue to be implemented to achieve greater efficiency and agility in administrative processes that contribute to the "paperless" policy: digitization of files, increasing the efficiency of the digitized process of the certifications of approval of the Mathematical Diagnostic Exam and the Institute of Mathematical Strengthening.
- Revamping the department's website, making it more agile, faster, more efficient and user-friendly: http://math.uprm.edu.
- Improvement of the servers and updating of the archives to continue offering the Institute for Mathematical Strengthening (INFOMATE) online. This initiative has had a significant impact, as it allows users to connect, regardless of where they are. The INFOMATE serves as a support for all students of the RUM, as well as for anyone who wishes to review the content of the topics prior to pre-calculus.
- Improvement of the servers and updating of the files to continue offering the Diagnostic Mathematics Test online, to increase its accessibility to all those new students who score 604 or less on the College Board PAA exam.
- Use of the *SignRequest platform for* the agile and efficient processing of administrative and student documents that require signatures from different departments and Deans.

- Obtaining the Online Teaching Certification offered by DECEP (Division of Continuing Education and Professional Studies) continues to be encouraged for all professors and teaching assistants in the department. In this way, the resource of distance learning is supported as an educational alternative and as a tool to obtain external funds.

F. OBJECTIVE 5: TO STRENGHTEN RESEARCH AND COMPETIVE CREATIVE ENDEAVORS

In addition to teaching, the RUM must contribute new knowledge, sponsor research on original problems and encourage publications. Our work is manifested through the graduate program, its theses, and the undergraduate program.

APPROVED PROPOSALS:

Dr. Karen Rios-CIU: Implementation: Medium: Computational and Data Science Curriculum Exchange Faculty Community of Practice, for $999,607,000 from the NSF was approved. More information can be found at the following link: https://www.nsf.gov/awardsearch/showAward?AWD_ID=2400201&HistoricalAwards=false
Dr. Omar Colón, Dr. Luis Cáceres- HEERF Funds from the Dean's Office of Students to carry out the Simulation of Pre-Calculus Exams

Dr. Omar Colón, Dr. Luis Cáceres- approved proposal of $50,000 by the Dean of Students to offer free Infomate and support workshops for pre-calculus courses in summer 2024
Epsilon Fund Award

APPROVED PUBLICATIONS:

Dr. Arturo Portnoy- *The Mathematics of Music and Art*, Synthesis Lectures on Mathematics & Statistics, Springer Cham, 2023, The Mathematics of Music and Art | SpringerLink https://link.springer.com/book/10.1007/978-3-031-34440-4

Dr. Luis Cáceres- Mathematics Olympiads Curriculum for Primary School in Ibero-America with Ariana Rodríguez and Lizbeth Alvarado, Journal of the WFNMC, Vol 36, No1, pp 13-24, 2023.

Dr. Roberto Rivera- "A modeling approach of return and volatility of structured investment products with caps and floors," junto a Jiaer He (ADEM) fue aceptado en el Journal: Forum Empresarial

Dr. Edwin Florez- Survey on Digital Twin Networks: Use cases and Enabling Technologies.

CONFERENCES, WORKSHOPS OR TALKS GIVEN NATIONALLY OR INTERNATIONALLY:

Dr. Arturo Portnoy**-** Course: *Music, Science and Mathematics: A Multidisciplinary Introductory Course of Great Beauty and Impact*, MEM Symposium 2023, Universidad Antonio Nariño, Bogotá, Colombia (February 17 and 18, 2023)

Dr. Arturo Portnoy**-** Music*, Science, and Mathematics: A Multidisciplinary Introductory Course of Great Beauty and Impact*, SIDIM 38, UPRM (University of Puerto Rico Mayagüez), Mayagüez, PR (February 25, 2023)

Dr. Arturo Portnoy**-** Virtual Presentation: *Mobile Automated Examination Lab*, Symposium on Strategies for University Success, University of Puerto Rico at Mayagüez (February 16 and 17, 2023)

Feliciano-Semidei, R., Palencia, K., & **Bustillo-Zárate, A**. (2024). An exploration of human factors that influence the acceptance of technology in calculus students. *Proceedings of the 26th Annual Conference on Research in Mathematics Undergraduate Education*

Dr. Omar Colón, Dr. Luis Cáceres- 64th International Mathematical Olympiad- July 2-13, 2023, Chiva, Japón

Dr. Omar Colón, Dr. Luis Cáceres- XVV Central American and Caribbean Mathematical Olympiad (OMCC 2023)- July 23 to 29, 2023, University of El Salvador

Dr. Omar Colón, Dr. Luis Cáceres- Ibero-American Mathematics Olympiad- September 6 to 12, 2023, Rio de Janeiro, Brazil

Dr. Omar Colón, Dr. Luis Cáceres- 31st- Annual Meeting of the Kangaroo Mathematics Association- October 7 to 16, 2023, Orhid City, Macedonia

Dr. Omar Colón, Dr. Luis Cáceres- XIII International Congress on Computer-Assisted Mathematics Teaching, December 7 to 11, 2023, San José, Costa Rica

Dr. Omar Colón, Dr. Luis Cáceres- Joint Meeting de la American Society (AMS), January 3-6, 2024, San Francisco, California

Dr. Omar Colón, Dr. Luis Cáceres- 18th Annual International Technology, Education and Development Conference (INTED 2024), March 4-6, 2024, Valencia, España

Dr. Omar Colón, Dr. Luis Cáceres- Meeting of the Kangaroo Association without Borders, Mathematical Kangaroo in Istanbul, May 8-12, 2024, Istanbul, Turkey

Dr. Omar Colón, Dr. Luis Cáceres- International Bebras Meeting, May 17-20, 2024, Serbia, Turkey

Dr. Edgardo Lorenzo**-** VIII Congress of Gerontology 2023, July 19-21, 2023, San José, Costa Rica

Dr. Israel A. Almodóvar**-** NSF Conference/Workshop-CISE Proposals, November 3, 2023, Caguas Puerto Rico

Dr. Roberto Rivera**-** NSF Conference/Workshop-CISE Proposals, November 3, 2023, Caguas Puerto Rico

Dr. Reyes Ortiz- 2023 Field of Dreams Conference, November 3-5, 2023, Atlanta, Georgia

Dr. Flor E. Narciso- International Metaphysics Meeting, Serapis group, March 22 to April 1, 2024, Panama

Dra. Dorothy Bollman- International Symposium on Intelligent Computing and Networking 2024 (ISICN 2024), March 18-20, 2024, Hyatt Place, San Juan PR

Dr. Reyes Ortiz- Oral Presentation: Some Results on -graphs, SIDIM 2024, UPR-Humacao, March 1-2, 2024.

Dr. Reyes Ortiz- Oral Presentation: Some Results in Number Theory, Colloquium at PythagoRUM, UPR (UNIVERSITY OF PUERTO RICO) Mayagüez, March 26, 2024

Dr. Dámaris Santana- Community Service Conference, April 4-8, 2024, Baha'i Community International

Dr. Edwin Florez- Challenging young minds: Bebras and creating computational thoughts. SIDIM 2024, March 1, 2024

LECTURES, WORKSHOPS, TALKS OR POSTERS PRESENTED BY GRADUATE OR UNDERGRADUATE STUDENTS SUPERVISED BY FACULTY:

- Duncan, B., Palencia, K., Feliciano-Semidei, R., Bustillo Zárate, A**.**, & Wu, K. (2024). *First generation calculus students' beliefs* [Poster session]. 26th Annual Conference on Research in Mathematics Undergraduate Education, Omaha, NE.
- Bustillo, A**.**, Palencia, K., & Feliciano-Semidei, R. (2023). *Calculus Students' Beliefs: A First Study* [Presentation]. Interuniversity Seminar on Research in the Mathematical Sciences XXXVIII (SIDIM). Mayagüez, PR.
- Bustillo, A., Palencia, K., & Feliciano-Semidei, R. (2023). *Students' perspectives about the use of technology in calculus classes* [Presentation in the research on undergraduate mathematics education session]. Math Fest 2023. Tampa, FL.
- Palencia, K. A., Feliciano-Semidei, R. *&* Bustillo, A. (2023). *Students' perspectives about learning and relevance of calculus* [Presentation in the Improving DEI in departments and programs, examples, and case studies session]. Math Fest 2023. Tampa, FL.
- Palencia, K. A., Feliciano-Semidei, R. *&* Bustillo, A. (2023). *The learning of Calculus considering student's view of relevancy and use of technology*, Conference on Diversity, Equity, and Student Success - American Association of Colleges and Universities (AAC&U), Henderson, NV.
- Bolaños Revelo, Cesar F.- Evento Académico- Isogenies of Elliptic Curves and their application to cryptography, July 24 to August 4, 2023, Cauca, Colombia
- Bolaños Revelo, Cesar F.- Meeting of Algebra, Number Theory, Combinatorics and Applications, November 27 to December 1, 2023, Cali, Colombia
- Bolaños Revelo, Cesar F.- Evento Académico- International Symposium on Intelligent Computing and Networking 2024 (ISICN 2024)

- Manzanares Elvir, Sergio D.- Ibero-American Mathematics Olympiad, September 6-12, 2023, Rio de Janeiro, Brazil

- Manzanares Elvir, Sergio D.- Puerto Rico Mathematics Olympiad 2022-2023 cycle, September 5-6, 2023, San Juan PR

- Ortiz Reyes, García Jean- SIDIM 2024, Humacao, PR, March 1-2, 2024.
  Afiche: On -factorizations and -graphs

SUBMITTED PUBLICATIONS:

Dr. Arturo Portnoy- Calculus to Analysis – An Introductory Transition, book to be published with Springer Nature. The 1st draft will be submitted on June 30, 2024. It is expected to be published by September 2024.

RESEARCH

Dr. Edwin Flórez-08/2022-Present development of automated fluid delivery system to advance neuroscience. in collaboration with Dr. Jose Agosto of the Biology Department of the University of Puerto Rico at Rio Piedras.

Dr. Edwin Flórez- ci-pi-02/2022-Present on existence of a strongly regular graph with $\lambda = 2$ and $\mu = 1$.
pi
Dr. Rafael Aparicio & Ms. Claudia Ordonez

Dr. Reyes Ortiz-A topological demonstration of the fundamental theorem of arithmetic, with Jhixon Macías, almost ready to give for publication.

Dr. Reyes Ortiz-Topology and infinity of primes is algebraic structures, with Jhixon Macías, in process.

Dr. Reyes Ortiz-The number of friendly factorizations, with Emigdio Ramos, in progress.

Dr. Reyes Ortiz-Factorizations Reduced, with Carmen Peña, in progress.

Dr. Reyes Ortiz-Sobre -grafts, were, with Byron Patiño, in progress.

Dr. Reyes Ortiz-On types of -primes, with Daniel Vásquez, in progress.

G. OBJECTIVE 6: TO IMPACT OUR PUERTO RICAN SOCIETY

Enhancing the Department of Mathematical Sciences at UPRM serves as a pivotal catalyst for positively affecting Puerto Rican society. By bolstering the department's infrastructure, resources, and academic programs, we can foster significant societal change in several key areas:

1. Education and Workforce Development: Strengthening the Math Department equips students with essential skills in critical thinking, problem-solving, and quantitative analysis. A robust mathematics education empowers individuals to pursue careers in STEM fields, contributing to Puerto Rico's workforce development and economic growth.

-Puerto Rico Mathematical Olympiads, OMPR: Project directed by Dr. Luis F. Cáceres and co-directed by Dr. Arturo Portnoy, focused on students from grades 3 to 11 at the island level who prepare talented students through Saturday academies and summer camps to stand for Puerto Rico in the IBERO Olympiad, in the CENTRO Olympiad and in the IMO Olympiad. Also, the May Olympiad, which is of international level at a distance**.**

-Institute for Mathematical Strengthening (INFOMATE). This is an intensive review that is strongly recommended for all students who do NOT obtain more than 50% in the Mathematics Diagnostic Test offered by the RUM to the new students to whom they apply. It was extended to any high school student who wants to review the math topics covered through grade 12. Also, all those people who need to refresh mathematical topics have been included, especially those who enter the Professional Improvement program.

2. Innovation and Research: Investing in research initiatives within the Math Department fosters innovation and technological advancement. By supporting faculty and student research projects, we can address local challenges, develop solutions, and contribute to Puerto Rico's scientific and technological landscape.

3. Community Engagement: The Math Department can actively engage with local communities through outreach programs, workshops, and collaborative projects. By promoting math literacy and STEM education initiatives, we can empower individuals from diverse backgrounds and foster a culture of lifelong learning.

College Board Committees.

Math lectures in schools across the island.

Team coaches and judges of national and international Olympiads.

Science Fair Judges

4. Social Impact Projects: The Math Department can spearhead social impact projects aimed at addressing societal challenges such as poverty, inequality, and access to education. By applying

mathematical modeling, data analysis, and predictive analytics, we can develop innovative solutions to pressing social issues.

5. Cultural Preservation: Mathematics is a universal language that transcends cultural boundaries. By incorporating elements of Puerto Rican culture and history into math curriculum and research, we can celebrate the island's rich heritage and promote cultural preservation.

Overall, the elevating capabilities of the Math Department has been changing and empowering individuals, its driven innovation has catalyzed a positive change throughout Puerto Rican society. Through our collaborative efforts and strategic investments, the Math Department has served as a beacon of excellence and a force for social transformation.

H. OBJECTIVE 7: TO STRENGTHEN SCHOOL SPIRIT, PRIDE, AND IDENTITY

Objective 7 aims to enhance school spirit, pride, and identity within the UPRM community. The focal point of this goal is the completion of the final phase in the remodeling of the Luis Monzón building, including the restoration of the Department of Mathematical Sciences, encompassing its academic, research, and administrative facilities. Currently, the ongoing renovation has created a significant impact, influencing various aspects of campus life.

The urgency of completing the remodeling stems from the department's crucial role within UPRM. Renowned for its exceptional service, the department faces many challenges due to inadequate facilities and resources. These challenges include technological shortcomings, spatial constraints during scheduling, overcrowded classrooms, staff shortages, and limited flexibility in addressing daily issues.

The repercussions of these challenges extend beyond administrative inconveniences; they directly affect the teaching-learning process and jeopardize the sense of belonging within the department. The absence of dedicated spaces for academic, research, and cultural activities disrupts the cohesion among students and faculty. The scattered relocation of departmental members across the campus impedes the organic exchange of ideas, academic collaboration, and research initiatives.

By addressing these pressing concerns through the completion of the remodeling project, the goal looks to foster a conducive environment for meaningful interactions among faculty, staff, and students. Restoring the department's facilities not only enhances academic functionality but also revitalizes the sense of unity, pride, and identity within the UPRM community. This revitalization is crucial for nurturing a vibrant academic atmosphere that promotes innovation, collaboration, and collective growth.

The Mathematics Department at UPRM remains dedicated to fostering excellence in education, advancing mathematical knowledge through research, and making a positive impact on the community. Looking ahead, we are committed to further enhancing our programs and initiatives to continue giving outstanding opportunities to our students and faculty.