

Annual Report 2023-2024

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- I. General Information of the Dean's Office and Associated Units
 - a. Mission and Vision
 - i. Mission and Vision of the Dean's Office

 - b. Organizational Structure
 - i. Organizational Chart of the Dean's Office

 - ii. Organizational Chart of associated units under the Dean's Office

II. Report on Initiatives, Activities, and Achievements in Accordance with the Strategic Plan

a. Executive Summary

During the academic year 2023-2024 the Department of Chemistry offered the courses in the modalities: face-to-face, hybrid, online and distance learning. During this academic year we continue working on the rehabilitation of the second floor and the ground floor west side of the building. As a result of these circumstances, great challenges were presented for the department that were attended administratively. In academic terms, the offerings of the laboratories of General Chemistry I (QUIM3133), General Chemistry II (QUIM3134) were taught assisted by technology. The General Chemistry I Laboratory (QUIM3041) and General Chemistry II Laboratory (QUIM3042L) were relocated for that year on the third and first floor, respectively and offered in the face-to-face modality. For the laboratories that were offered assisted by technology, the Beyond LabZ application was used to perform simulations of experiments in General Chemistry.

The graduate seminar program continued to be active with guest speakers, professors of the department and the university, representatives of the chemical and pharmaceutical industries as well as graduate students. In terms of service to students, we continue to use the tool to attend the registration (tickets), but we also attended students in person. New students were also welcomed in person. 54 proposals were approved. Graduate students have continued with their research projects following established safety protocols. In the 2023-2024 academic year, 65 new graduate students were accepted. On the other hand, 30 students completed their B.S. degree in Chemistry, 4 completed their MS degree in Chemistry, and 4 students completed their Ph.D. degree in Applied Chemistry.

b. Objective 1: To institutionalize a culture of strategic planning and assessment

During the 2020-2021 academic year, Dr. Rodolfo Romañach was appointed as representative to the faculty for the Strategic Planning Committee and currently continues to work on this committee.

c. Objective 2: To lead higher education throughout Puerto Rico while guaranteeing the best education for our students

- The faculty of the Department of Chemistry approved in the spring of 2020 that Chemistry lecture courses can be offered in hybrid or distance mode, following Certification 19-85 of the Academic Senate of the RUM. This allowed that in the academic year 2023-2024 several courses were offered in Distance and Hybrid modality by the professors who have the CREAD Certification.
- We continue with the offer of the Certification in Biochemistry.
- In the 2023-2024 academic year, we continue with classroom technology installations. They are made to make smart classrooms, where we can have hybrid classes with a number of students in person and others virtually.
- A new General Chemistry for Engineering course was created for engineering students. This course was approved for the Chemistry faculty. It also has been approved by the university Academic Senate.
- The Doctoral Seminar program was active throughout the year 2023-2024, using the modalities: virtual, hybrid and face-to-face. This was coordinated and directed by Dr. Carmen Amaralis Vega Olivencia.

Seminars offered in the Department of Chemistry during the academic year 2023-2024

DATE	LECTURER	TITLE	INSTITUTION
25/ago/2023	Dra. Joselyn Del Pilar	Nothing Last Forever; Investigating Adsorption and Photo degradation Strategies for Mitigating Per- and Polyfluoroalkyl Substance (PFAS) Nothing Contamination in Water	UPRM
1/sept/2023	Dr. Emil Ciurezak	A Career as a Consultant.	NY
8/sept/2023	Dra. Yomaira Pagán Torres	Advanced Catalytic Approaches for Biomass-Derived Feedstock and Carbon Dioxide Conversion to Chemicals"	Chemical Engineering Department - UPRM
15/sept/2023	Dr. Andrés Moya Rodríguez	De química a biofísica a ingeniería: Desarrollo de biosensores y dispositivos fluidicos.	University of Chicago
29/sept/2023	Prof. José J. Morales Benites	Una Mirada Introductoria a "Science Finder"	GRIC - Biblioteca RUM
6/oct/2023	Mr. Jaaziel E. García	The Poriferans: Ancient water beings - The giant barrel sponge, Xestospongia muta, functioning as oases for biodiversity"	Dept Ciencias Marinas
13/oct/2023	Emil Hernández Pagán	Coupling a molecular understanding to the solutionsynthesis of nanomaterials"	Universidad de Delawer
20/oct/2023	Mr. Michael Lu Díaz	Strategies to Control Dopant-induced Effects in Conductive Polymers	Candidato Doctoral - Univ. Mass
27/oct/2023	Dr. Koide	Reagent-controlled chemoselectivity in alkali-metal reduction for drug-like molecule synthesis	Universidad de Pittsburg
3/nov/2023	Dr. Arturo Hernández	Trace CO2 Removal from Humid Gas Using Hierarchical Silicoaluminophosphate/Carbon Composite Adsorbents	UPRM - Ing. Química
10/nov/2023	Ms. Glorimar Franquel Rivera	Shark Research in Puerto Rico	Ciencias Marinas , RUM
1/dic/2023	Dr. Travis Courtney	Coral reef calcification and biogeochemistry under environmental change	Ciencias Marinas RUM
2/feb/2024	Prof. José Morales Benítez	Taller de Búsqueda en SciFinder	Biblioteca General UPRM
9/feb/2024	Dr. Rogelio Lugo Camacho	Artificial Ingelligence	Biblioteca Escuela de Medicina UPR
16/feb/2024	Dra. Agnes Padovani	Diversity, Equity & Inclusion in STEM	Ingeniería de Ciencias y Materiales UPRM
23/feb/2024	Profa. Gloria Cecilia Vega Ávila	APLICACIONES DE LA ESPECTROSCOPIA POR RMN en ANÁLISIS DEL MÚSCULO ESQUELÉTICO	Univ. Antonio José Camacho, Cali, Colombia
1/marzo/2024	Norman A. Burgos León	Analysis of the Damage Sustained by the NWS Doppler Radar	Dept. Ing. Civil UPRM
8/marzo/2024	Dr. José A. Centeno	Topics in Environmental and Chemical Toxicology	Adjunct Professor, University of Maryland School of Medicine
15/marzo/2024	Jorge Plata Enriquez	Analytical method development using mid-ir lasers for determining low concentrations of active pharmaceutical ingredients (apis) and high energetic materials (he)	Candidato Dctoral- Dept. Química - UPRM
7/marzo/2024	Ileska Casano Miñiz	Assessment of Ecotoxicology and Accumulation Capacity of Zinc Oxide Nanoparticles and Benzophenone-2 UV Filters Using In Vivo Models	Candidata Dctoral- Dept. Química - UPRM

5/abril/2024	Josian Lucino Velázquez	Synthesis of Zn-based Quantum Dots and their effect on the growth in Ocimum basilicum plants	Candidato Dctoral-Dept. Química - UPRM
12/abril/2024	Melissa Ortiz Román	Assessing the Ecotoxicological Impacts of Sunscreen Components (Benzophenone-3 and TiO ₂ NPs) Through In Vivo Models	Candidata Dctoral-Dept. Química - UPRM
19/abril/2024	Lysmarie Santos Velázquez	Insights into Sulfhemoglobin Detection: Analyzing the Correlation of Absorption and Emission Wavelengths"	Candidata Dctoral-Dept. Química - UPRM
26/abril/2024	Genesis Lorenzana Vázquez	Design of Gold Nanoparticles Functionalized with Biologically Active Compounds for Enhanced Antiproliferative Effects in Breast Cancer Cells Using Photothermal Therapy	Candidata Dctoral-Dept. Química - UPRM
3/mayo/2024	Leany Lugo Aviles	Biosolid mixtures applied in tropical soils and their effect on Coriandrum sativum and Ocimum basilicum nutritional uptake.	Candidata Dctoral-Dept. Química - UPRM

d. Objective 3: To increase and diversify the Institution's sources of revenue

Proposals submitted by the Department of Chemistry during the academic year 2023- 2024

Proposal Title	Principal Investigator	Total Cost	Proposal Status	Sponsor Name
RISE: ENHANCING BIOMEDICAL ACHIEVEMENT IN	Miguel Castro	\$263,694.00	Activos	NIH
YR2 RISE: ENHANCING BIOMEDICAL ACHIVEMENT	Miguel Castro	\$78,994.68	Activos	NIH
RISE YR3	Miguel Castro	\$75,173.64	Activos	NIH
RISE YR4	Miguel Castro	\$75,173.64	Activos	NIH
RISE/YR5	Miguel Castro	\$75,173.64	Activos	NIH
P/S RISE YR2	Miguel Castro	\$171,616.32	Activos	NIH
P/S RISE YR3	Miguel Castro	\$175,437.36	Activos	NIH
RISE YR4 P/S	Miguel Castro	\$175,437.36	Activos	NIH
RISE/P/S YR5	Miguel Castro	\$175,437.36	Activos	NIH
SUPLEMENT YR3/ RISE	Miguel Castro	\$83,927.00	Activos	NIH
MRI:TRACK 1: ACQUISITION OF A ZEISS 560 V	Marco De Jesús	\$988,884.00	Activos	NSF
ENHANCING EXPERIENTIAL LEARNING BY ASSESS	Samuel Hernández	\$678,286.00	Activos	USDA
P/S ENHANCING EXPERIENTIAL LEARNING...	Samuel Hernández	\$166,714.00	Activos	USDA
SUBAWARD:ENHANCING EXPERIENTIAL LEARNING	Samuel Hernández	\$155,000.00	Activos	USDA
CYTATION 5 MULTIMODE IMAGING SYSTEM FOR U	José Carmona	\$244,901.00	Activos	NIH
PROBING THE EFFECTS OF NANOPARTICLE MORPH	Marco De Jesús	\$454,623.00	Activos	NSF
RENOVATIO OF NUCLEAR MAGNETIC RESONANCE F	Enrique Meléndez	\$430,070.00	Activos	USDA
INNOVATIVE WIDE AREA SENSING MITIGATION T	Samuel Hernández	\$497,555.00	Activos	DHS-ARI
PART/SUPPORT INNOVATIVE WIDE AREA SENSING	Samuel Hernández	\$2,440.00	Activos	DHS-ARI

YR2/INNOVATIVE WIDE AREA SENSING MITIGATI	Samuel Hernández	\$499,994.00	Activos	DHS-ARI
YR3-INNOVATIVE WIDE AREA SENSING MITIGATI	Samuel Hernández	\$499,994.00	Activos	DHS-ARI
EFFECT OF UPR PATENT ON SARS COVID 3 CELL	Miguel Castro	\$249,018.00	Activos	DEPT OF COMMER
SUB:ADVANCING STRUCTURAL BIOLOGY TECHNOLO	José Carmona	\$24,975.00	Activos	DOE
A KNOWLEDGE MANAGEMENT SYSTEM FOR CONTINU	Rodolfo Romañach	\$73,000.00	Activos	NIPTE
BIOENERGY & WATER FOR AGRI RESEARCH	Felix Román	\$244,895.00	Activos	UNIV TEXAS AT
SENTRY RB-1: ADVANCED DETECTION & MITIGAT	Samuel Hernández	\$125,000.00	Activos	NORTHEASTERN U
SENTRY RB-1/YEAR 2	Samuel Hernández	\$117,000.00	Activos	NORTHEASTERN U
SENTRY/YR2 P/S	Samuel Hernández	\$8,000.00	Activos	NORTHEASTERN U
SENTRY- YEAR 3	Samuel Hernández	\$117,000.00	Activos	NORTHEASTERN U
SENTRY-YEAR 3	Samuel Hernández	\$8,000.00	Activos	NORTHEASTERN U
MAIN: MULTIFUNCTIONAL ZEOLITE-CHITOSAN CO	Joselyn Del Pilar	\$272,497.00	Activos	DEPT. OF ENERG
P/S: MULTIFUNCTIONAL ZEOLITE-CHITOSAN COM	Joselyn Del Pilar	\$2,490.00	Activos	DEPT. OF ENERG
SBW:SRNL MULTIFUNCTIONAL ZEOLITE-CHITOSAN	Joselyn Del Pilar	\$39,773.00	Activos	DEPT. OF ENERG
CONTINUOUS DRUG SUBSTANCE MANUFACTURING F	Rodolfo Romañach	\$170,419.00	Activos	NIPTE
CSTWR2/MARCOS DE JESUS	Marco De Jesús	\$193,093.21	Activos	RCSE
CSTWR2/FELIX ROMAN	Marco De Jesús	\$205,092.38	Activos	RCSE
CSTWR2/DAVID SULEIMAN	Marco De Jesús	\$113,259.38	Activos	RCSE
CSTWR2/MATIAS CAFARO	Marco De Jesús	\$113,348.85	Activos	RCSE
CSTWR2/PEDRO TARAF	Marco De Jesús	\$112,956.18	Activos	RCSE
USING FUNCTIONALIZED PAPTIDE-BASED GOLD N	Elsie Parés	\$75,000.00	Activos	RCSE
PR-INBRE-PR IDeA Network for Biomedical E	Juan López	\$39,888.00	Activos	RCSE
GENERAL DEVELOPMENT AND SUPPORT	Rodolfo Romañach	\$23,253.00	Activos	VARIAS
SCIENCE & SPACE COMMUNICATIONS ON WHEEL	Juan López	\$587,839.52	Activos	VARIAS
ERC ON STRUCTURED ORGANIC PARTICULATE SYS	Rodolfo Romañach	\$260,392.00	Activos	VARIAS
COMMERCIALIZATION OF AN INTEGRATED SYSTEM	Rodolfo Romañach	\$150,000.00	Activos	PR SCIENCE,TE
PHASE1-FEASIBILITY STUDY FOR THE CONTINUO	Rodolfo Romañach	\$102,402.00	Activos	McNeil HEALTHC
A NIR SPECTROSCOPIC CALIBRATION MODEL FOR	Rodolfo Romañach	\$42,037.00	Activos	AVARA
MANTENIMIENTO EQUIPO LABORATORIO QUIMICA	Rodolfo Romañach	\$42,282.00	Activos	VARIAS

MANTENIMIENTO EQUIPO LABORATORIO ANALITIC	Felix Román	\$2,000.00	Activos	VARIAS
STRATEGIC SOLVOTHERMAL SYNTHESIS DESIGN F	Joselyn Del Pilar	\$14,427.00	Activos	PR SCIENCE TEC
SLOAN FOUNDATION	Rodolfo Romañach	\$498,065.00	Activos	ALFRED P. SLOA
PAREO/CSTWR2	Marco De Jesús	\$375,000.00	Activos	RCSE
PAREO AC: RISE: ENHANCING BIOMEDICAL ACHI	Miguel Castro	\$176,892.00	Activos	UPR
PAREO RUM: RISE: ENHANCING BIOMEDICAL ACH	Miguel Castro	\$117,928.00	Activos	UPRM

e. Objective 4: To implement efficient and expedite administrative procedures

- Roadmaps continue to be used for administrative procedures.
- In the week of the administrative staff, an activity was carried out to recognize all the staff with the contributions of the Department faculty members. The activity consisted of a lunch and a gift to our administrative staff.
- The meetings of the different committees were held in person, hybrid and virtually.
- The administrative staff of the Department of Chemistry continues to take training in the use of technology to carry out administrative procedures, to hold meetings, and to serve students virtually and in person.

f. Objective 5: To strengthen research and competitive creative endeavors

During the 2023-2024 academic year, researchers from the Department of Chemistry, for the most part, continued with the development of their research projects and the mentoring of graduate and undergraduate students.

Scientific Articles of the Department of Chemistry published during the academic year 2023-2024

1. Patel, D.S., R. Méndez, and R.J. Romañach, Cleaning of direct compression continuous manufacturing equipment through displacement of API residues by excipients. *International Journal of Pharmaceutics*, 2024. 652: p. 123849.
2. Valentin Román, N.; Alvarado Hernández, B.; De Hoyos Ruperto, M.; **Romañach, R. J.**, Engineering, Validation, Automation and Service companies in the Pharmaceutical Manufacturing Ecosystem,. *Pharmaceutical outsourcing*, 2024, 25 (1), 12-15.
3. Caballero-Agosto, E. R.; Sierra-Vega, N. O.; Rolon-Ocasio, Y.; **Hernandez-Rivera, S. P.**; Infante-Degró, R. A.; Fontalvo-Gomez, M.; Pacheco-Londoño, L. C.; Infante-Castillo, R., Detection and quantification of corn starch and wheat flour as adulterants in milk powder by near- and mid-infrared spectroscopy coupled with chemometric routines. *Food Chemistry Advances* 2024, 4, 100582.
4. Rodríguez Martínez, O. M.; Narváez Ramos, M. A.; Soto Acevedo, A. A.; Colón Colón, C. C.; Malavé Ramos, D.; Castro Rivera, C.; **Castro Rosario, M. E.** pH-Selective Reactions to Selectively Reduce Cancer Cell Proliferation: Effect of CaS Nanostructures in Human Skin Melanoma and Benign Fibroblasts *BioChem [Online]*, 2023, p. 15-30.
5. González-Velázquez, J., Salas-Vázquez, E., & **López-Moreno, M. L.** (2023). Effect of hydrogen sulfide on cadmium and macro- and micronutrients uptake by *Leucaena leucocephala*. *Chemical Papers*, 77(9), 5421-5430. doi:10.1007/s11696-023-02874-5

6. Chaudhary, M.; Kumar, A.; Devi, A.; Singh, B. P.; Malhotra, B. D.; Singhal, K.; Shukla, S.; Ponnada, S.; Sharma, R. K.; **Vega-Olivencia, C. A.**; Tyagi, S.; Singhal, R., Prospects of nanostructure-based electrochemical sensors for drug detection: a review. *Materials Advances* 2023.
 7. Lorenzana-Vázquez, G., Pavel, I., & Meléndez, E. (2023). Gold Nanoparticles Functionalized with 2-Thiouracil for Antiproliferative and Photothermal Therapies in Breast Cancer Cells. *Molecules*, 28(11), 4453. Retrieved from <https://www.mdpi.com/1420-3049/28/11/4453>
 8. Rangel-Gil, R. S.; Sierra-Vega, N. O.; **Romañach, R. J.**; Méndez, R., Assessment of blend uniformity in a stream sampler device using Raman spectroscopy. *Int. J. Pharm.* **2023**, 639, 122934.
 9. **Romañach, R. J.**; Stelzer, T.; Sanchez, E.; Muzzio, F., Advanced pharmaceutical manufacturing: A functional definition. *Journal of Advanced Manufacturing and Processing* 2023, 5 (2), e10150.
 10. **Romañach, R. J.**, Moving to Manufacturing – Lessons Learned in A Career in Process Analytical Technology. In *Continuous Pharmaceutical Processing and Process Analytical Technology*, Narang, A. S.; Dubey, A., Eds. Taylor & Francis Group: Boca Raton, 2023; p 456.
 11. Feng Báez, J. P., George De la Rosa, M. V., Alvarado-Hernández, B. B., **Romañach, R. J.**, & Stelzer, T. (2023). Evaluation of a compact composite sensor array for concentration monitoring of solutions and suspensions via multivariate analysis. *Journal of Pharmaceutical and Biomedical Analysis*, 233, 115451. doi:<https://doi.org/10.1016/j.jpba.2023.115451>
 12. Echeverría-Altamar, K., Alvarado-Hernandez, B. B., Resto-Irizarry, P., & **Romañach, R. J.** (2023). Identification of Four Similar Cell Culture Media According to their Glucose, Glutamine, and Pyruvate Content by Handheld Raman Spectroscopy. *Pharmaceutical Research*. doi:10.1007/s11095-023-03584-z
 13. Movilla-Meza, N. A., Sierra-Vega, N. O., Alvarado-Hernández, B. B., Méndez, R., & **Romañach, R. J.** (2023). The Use of a Closed Feed Frame for the Development of Near-Infrared Spectroscopic Calibration Model to Determine Drug Concentration. *Pharmaceutical Research*. doi:10.1007/s11095-023-03601-1
- g. Objective 6: To impact our Puerto Rican society
- Welcome to new graduates – August 4, 2023.
 - Welcome to new graduate students – August 4, 2023 and January 9, 2024.
 - The university held the Open House in October 2023.
 - During the summer of 2023, The College of Arts and Sciences camp was carry out for high school students. The chemistry department had the participation of associations, staff, professors and graduate’s students.
- h. Objective 7: To strengthen school spirit, pride, and identity
- Amended exit assessment forms for students who are candidates for graduation so that they can evaluate the administrative, academic and infrastructural matters of the department.
 - The ACS, also participated in the Chemistry Festival held in San Juan, PR, during the month of April. This was during the celebration of National Chemistry Week. The purpose of this festival is to impact the community of the Island and share the knowledge of Chemistry through experiments, demonstrations and other practical activities of a chemistry scientific nature.
 - The ACS held a fraternization (Chem-off), part of one of the activities was to prepare a "crime scene" in which the members of the association had to observe and solve.