betzaida.castillo1@upr.edu

Cell: (939) 219-1878

## PROFESSIONAL SUMMARY

Highly accomplished, visionary team player, innovative scientific professional and passionate educator with twenty years of research laboratory and teaching experience. Committed to student development and success and the learning experience. Skilled in learning new educational technologies and in the design of challenging, innovative, and engaging learning activities that promote student life skills development while enhancing discipline learning. Possess ability to develop and implement diverse teaching and learning strategies that accommodate the learning styles of students and that emphasize relevance of class material to the world beyond the classroom. Possess outstanding communication, writing and interpersonal skills; vast experience working with multi-disciplinary research/scientific teams and professionals; and establishes quality relationships with students.

#### Areas of experience include:

Research Project Management • Protein Characterization: Stability, Structure, Dynamic and Function • Biotechnology: Protein Engineering, Intracellular Gene Delivery • Non-Aqueous Enzymology: Employment of Enzymes for Stereo-Selective Synthesis • Mammalian Cell Culture • Evaluation of Biological and Toxicological Data • Analytical Instrumentation: Fourier Transform Infrared Spectroscopy (FT-IR), UV-Vis, pH meter, High Performance Liquid Chromatography (HPLC), Differential Scanning Calorimeter (DSC), Isothermal Calorimeter (ITC), Gas Chromatography (GC), Fluorimeter, Microplate Reader, and Luminometer • Emerging Technologies and Alternative Delivery Methods • Collaborative & Interactive Learning • Student Motivation • Teamwork & Leadership • Teaching Planning • Differentiated Instruction • Classroom Management • Staff Development • Diversity Awareness • Student Assessment • Computer Software: Microsoft Office Word, Excel, PowerPoint, Sigma Plot, Chem Draw, Moodle and Blackboard (web- enhanced and online courses management system)

### **EDUCATION**

<b>Post-Doctoral Fellow; Bioorganic Chemistry &amp; Biotechnology</b> University of Puerto Rico, Humacao Campus	2009 - 2011
PhD Biochemistry and Biotechnology University of Puerto Rico, Río Piedras Campus, magna cum laude	2009
<b>B.S. Industrial Chemistry</b> University of Puerto Rico, Humacao Campus, <i>magna cum laude</i>	2002
<u>Certifications and Licenses</u> : <b>Texas Educator Certificate</b> , Texas Teachers Alternative Certification Program <b>Virtual Educator Certificate</b> , University of Puerto Rico - Humacao	2016 2020
Languages: English and Spanish	

Castillo, B.

#### Castillo, B.

# **BETZAIDA CASTILLO-CRUZ, Ph.D.**

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## TEACHING EXPERIENCE

### **Assistant Professor**

University of Puerto Rico, Humacao Campus *QUIM 3001 & 3002 – General Chemistry Lecture I & II QUIM 3003 & 3004 – General Chemistry Laboratory I & II QUIM 3033 – Organic Chemistry I Laboratory QUIM 3161 – Inorganic and Organic Chemistry Lecture for Nursing QUIM 3162 – Organic Chemistry II and Biochemistry Lecture for Nursing QUIM 3013 – General and Organic Chemistry I Laboratory for Nursing QUIM 3014 – Organic Chemistry II and Biochemistry Laboratory for Nursing Achievements:* 

- Prepared, and implemented instructional activities that contribute to a climate where students are actively engaged in meaningful learning experiences.
- Identified, selected, created, and modified instructional resources to meet the needs of the students with varying backgrounds, learning styles, and special needs.
- Established and maintained positive relationships with students and colleagues, fostering an environment of open communication and support.
- Collaborated with peers to enhance the instructional environment for students by participation in activities including meetings and staff development.
- Assisted and trained students in developing appropriate study skills (guidance on reading and note-taking, skills on using the internet, etc) for them to complete the course effectively.

### **Adjunct Chemistry Professor**

Interamerican University of Puerto Rico, Metro Campus CHEM 4220 – Biochemistry Lecture and Laboratory CHEM 1111 & 2212 – General Chemistry I & II Lecture (Spanish / English) CHEM 3320 – Analytical Chemistry Laboratory

## Chemistry Department Coordinator

Mentor Teacher Pre-Advanced & Advanced Placement Chemistry Teacher

Grand Prairie ISD, Texas

#### Achievements:

- Evaluate and track the progress of the department.
- Responsible for department meetings to address different aspects such as setting performance expectations, providing performance feedback, and handling of personnel issues.
- Participate in curricular revision, in the design and determination of content, the objectives, methods, techniques and strategies that will have to be adopted for the courses to be taught.
- Offer direction in areas like course planning, professional development, special education, standardized testing improvement.
- Observe teacher performance and provide peer assistance and coaching.

2017 – Present

2017 - 2018

2015 - 2017

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**Teacher Assistant, IN PHYSICAL SCIENCES Texas Educator Certificate** 

Dallas Environmental Science Academy, Texas

#### Achievements:

- Tutor students individually or in small groups to reinforce and follow-up learning activities. •
- Assist with classroom management, such as by copying, organizing instructional materials, and • filing materials for distribution to students.
- Assist with the supervision of students throughout the day, inside and outside the classroom, • including hall, lunchroom, and auditorium.
- Provide instructional assistance in a computer laboratory. •
- Conduct parental involvement activities. •
- Act as a bilingual aide. •
- Participate in staff-development training programs to improve job performance. •
- Participate in faculty meetings and special events as assigned.

#### **Adjunct Chemistry Professor**

Stetson University, Florida

Taught General Chemistry Laboratory and Organic Chemistry Laboratory Responsibilities included assisting students in experiments and grading lab write-ups, holding weekly office hours, and evaluating student scientific writing abilities.

#### **Professor of Chemistry**

Seminole State College of Florida, Florida

Taught Contemporary Chemistry Lecture (elective) and Foundations of College Chemistry Lecture Achievements:

- Integrated technology into curriculum, supplementing class lectures, and utilized a variety of • teaching methods to meet the needs of individual students.
- Planned and developed engaging learning activities, promoting student leadership, while • maintaining an active and accessible instructor presence.
- Provided students with academic support-tutoring, advising, and coaching. •
- Established and maintained positive relationships with students and colleagues, fostering an • environment of open communication and support.
- Prepared and submitted required documentation including course syllabi, student attendance • records, final course grades, and other information as requested or required by the college.
- Participated in professional development activities to enhance skills in various instructional • strategies and knowledge of learning.

#### **Assistant Professor**

University of Puerto Rico, Humacao Campus QUIM 3161 – Inorganic and Organic Chemistry Lecture for Nursing Students QUIM 3003 & 3004 – General Chemistry Laboratory I & II

2008 - 2011

2014 - 2015

#### 2011 - 2014

2013 - 2014

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## **Teaching Assistant**

University of Puerto Rico, Río Piedras Campus QUIM 3003 & 3004 – General Chemistry Laboratory I & II

## **Undergraduate Students Mentor**

University of Puerto Rico, Humacao Campus TADQ 3001 & 3002 – General Chemistry I & II TADQ 3031 & 3032 – Organic Chemistry I & II TADQ 4041 & 4042 – Physical Chemistry I & II Achievements:

- Discussed assigned subject material with course professor to coordinate instructional support.
- Planned, prepared, and developed various teaching aids and supporting material to facilitate students to comprehend and apply the newly learned content intelligently.
- Assisted students to become independent and collaborative learners.

## RESEARCH EXPERIENCE

## Collaborator

Puerto Rico Outstanding Undergraduate & Diversified (PROUD) University of Puerto Rico, Humacao Campus Principal Investigator: Dra. Lilliam Casillas, Dr. Josee Vedrine-Pauléus (Co-director) The primary goal of my education research project is to implement evidence-based teaching strategies in the General Chemistry course and investigate the effect of these strategies on students' performance, retention, and perception.

#### **Research Associate Research Consultant**

Bioorganic Chemistry Lab; University of Puerto Rico, Humacao Campus

**Essential Position Functions:** 

- Participated in research grant application preparation.
- Contributed to research study design including methodology and analysis of data.
- Prepared results for reports and publications.

#### **Postdoctoral Researcher**

Bioorganic Chemistry Lab; University of Puerto Rico, Humacao Campus Research Advisor: Dr. Gabriel Barletta

The primary goal of my research project was to design new drug delivery systems based on cationic polymers and polymer encapsulated magnetic nanoparticles for cancer therapy. The toxicity and efficiency of intracellular delivery of short interfering RNA (siRNA) by using these nanoparticles-based carriers was studied.

The siRNA transfection efficiency of the nanoparticles was evaluated by conducting a knockdown efficiency study using a dual luciferase reporter assay, and toxicity was studied by the cell proliferation (MTS) and by the lactate dehydrogenase assays (LDH) in HeLa and CHO-K1 cells lines.

2017 - Present

2011

2009 - 2011

1998 – 2002

2002 - 2003

2022 – Present

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#### **Essential Position Functions:**

- Served as project leader by defining roles, responsibilities, project scope, and timelines.
- Mentored undergraduate students.
- Designed and conducted non-routine complex experiments and procedures.
- Performed data analysis and interpretation.
- Wrote and edited articles for publication.
- Presented results of the research to the scientific community.
- Fostered and supported external research collaborations.

#### **Doctoral Researcher**

2002 - 2009

Biochemistry & Biotechnology Lab; University of Puerto Rico, Río Piedras Campus Research Advisor: Dr. Kai Griebenow

My research project was directed to the biochemical (function) and biophysical (thermodynamic stability, structure, and conformational dynamic) characterization of different protein formulations to further the understanding of enzyme behavior in organic solvents. In addition, I was involved in research directed to employ enzymes in organic medium to catalyze stereo-selective synthetic reactions.

The catalytic efficiency of these different protein formulations was determined by measuring the product formation using a variety of chromatographic techniques such as GC and HPLC. The protein structural dynamic was evaluated using H/D exchange FT-IR spectroscopy. FT-IR spectroscopy experiments were conducted to characterize the secondary structure of all the protein formulations. Protein stability was investigated by conducting thermodynamic unfolding experiments using a differential scanning calorimeter.

Essential Position Functions:

- Managed the development and validation of analytical methods such as GC, HPLC, DSC, and FT-IR.
- Designed/executed experiments.
- Analyzed data and summarized results and procedures, generating reports and articles for publication.
- Presented research work in departmental seminars, and national and international conferences.
- Trained new students and employees.

#### Undergraduate Research Assistant

Bioorganic Chemistry Lab; University of Puerto Rico, Humacao Campus Research Advisor: Dr. Gabriel Barletta

My research project involved the study of the catalytic efficiency in organic medium of a variety of newly developed enzyme formulations.

#### **Essential Position Functions:**

- Conducted experiments to study the functional behavior of a wide variety of enzyme formulations using UV-Vis, GC, and HPLC as analytical methods.
- Prepared samples, reagents, and standard solutions.
- Monitored and maintained adequate inventories of consumables, chemical/compounds, and solvents.

2001 - 2002

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## PROFESSIONAL TRAINING AND WORKSHOPS

- HHMI Inclusive Excellence Inter-University Dialogue (2022)
- 20th Best Practice Conference on Teaching and Learning (2022)
- Flipping the Classroom: Application in Face-to-Face and Virtual Teaching (2022)
- Tools for continuous improvement in student learning and institutional effectiveness (2022)
- Strategic communication for directors and faculty (Cycle): Set goals, Situation Analysis, and Action Plan (2022)
- Student Data Assessment: Strategies for an Effective Data Organization (2021)
- Distance Learning: Online Courses Development (2020)
- CITI Health Information Privacy and Security (HIPS) for Students and Instructors (2019)
- GCP for Clinical Trials with Investigational Drugs and Biologics (2019)
- Biomedical Research in Human Subjects (2019)
- Biosafety and Biosecurity (2019)
- Creativity and Innovation: Classroom and Beyond (2014)
- Flipping the Classroom: Strategies, Tools and Success (2013)
- New to Online: The Essentials (2013)
- Two-Day Strategic Grant Development (2013)
- College Travel Process & Approvals (2013)
- Diversity Matters (2013)
- Adaptive Learning in the Sciences: Addressing the needs of today's students (2013)
- Assessment and Technology (2013)
- Instructional Strategies (2012)
- The Not-So-Secret to Competitive Grant Applications: Tell Them What They Want to Hear (2012)
- 5th Annual Florida Statewide Symposium: ENGAGEMENT IN UNDERGRADUATE RESEARCH (2012)
- Surviving the 21st Century Classroom (2012)
- Collaboration with the I Generation (2012)
- Lecture Strategies (2012)
- The Ins and Outs of Seminole State College (College Policies, Syllabi, and more) (2012)
- Sakai Online Workshop (2012)

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## PUBLICATIONS

- 1. **Castillo, B.**, Flores, M., Rabelo, R., Chinapen, S., Vivas, P., Barletta, G. (**2022**) "A Fresh Look at the Potential of Cyclodextrins for Improving the Delivery of siRNA Encapsulated in Liposome Nanocarriers". ACS Omega 7 (4): 3731-3737
- 2. Morales-Cruz M, Delgado Y, **Castillo B**, Figueroa CM, Molina AM, Torres A, Milián M, Griebenow K. (2019) "Smart Targeting To Improve Cancer Therapeutics". Drug Design, Development and Therapy". 13: 3753-3772.
- 3. **Castillo, B.**, Bromberg, L., Lopez, X., Badillo, V., González, J., González, C., Hatton, T.A., and Barletta, G. (**2012**) "Intracellular Delivery of siRNA by Polycationic Superparamagnetic Nanoparticles". *Journal of Drug Delivery*. 2012; 1-12.
- 4. **Castillo, B.**, Delgado, Y., Barletta, G., and Griebenow, K. (**2010**) "Enantioselective Transesterification Catalysis by Nanosized Serine Protease Subtilisin Carlsberg Particles in Tetrahydrofuran". *Tetrahedron*. 66: 2175-2180.
- Rodríguez, J., Solá, R., Castillo, B., Cintrón, H., Rivera, I., Barletta, G., and Griebenow, K. (2008) "Stabilization of Alpha- Chymotrypsin upon PEGylation Correlates with Reduced Structural Dynamics". *Biotechnol. Bioeng.* 101: 1142-1149.
- 6. **Castillo, B.**, Solá, R., Ferrer, A., Barletta, G., and Griebenow, K. (**2008**) "Effect of PEG Modification on Subtilisin Carlsberg Activity, Enantioselectivity, and Structural Dynamics in 1,4 Dioxane". *Biotechnol. Bioeng.* 99: 9-17.
- Castillo, B., Bansal, V., Ganesan, A., Halling P., Secundo F., Ferrer, A., Griebenow, K., Barletta, G. (2006) "On the Activity Loss of Hydrolases in Organic Solvents: II. A Mechanistic Study of Subtilisin Carlsberg". *BMC Biotechnol.* 6: 51.
- Fasoli, E., Castillo, B., Santos, A., Silva, E., Ferrer, A., Rosario, E., Griebenow, K., Secundo, F., and and Barletta, G. (2006) "Activation of Subtilisin Carlsberg in Organic Solvents by Methyl-β- Cyclodextrin: Lyoprotection vs Substrate and Product-Complex Effect". *Journal of Molecular Catalysis B: Enzymatic.* 42: 20-26.
- Castillo, B., Méndez, J., Al-zzam, W., Barletta, G., and Griebenow, K. (2006) "On the Relationship Between the Activity and Structure of PEG-α-Chymotrypsin Conjugates in Organic Solvents". *Biotechnol. Bioeng.* 94: 565-574.
- Castillo, B., Pacheco, Y., Al-Azzam, W., Griebenow, K., Devi, M., Ferrer, A., Barletta, G. (2005) "On the Activity Loss of Hydrolases in Organic Solvents. Rapid Loss of Activity of a Variety of Enzymes and Formulations in a Range of Organic Solvents". *Journal of Molecular Catalysis B: Enzymatic* 35: 147-153.

## ACHIEVEMENTS AND AWARDS

- 10 publications in peer-reviewed journal (2005 2022)
- 13 presentations of research work in national and international conferences (2002 2008)
- Research Initiative for Scientific Enhancement (RISE) Fellowship, University of Puerto Rico (2007 2009)
- National Aeronautics and Space Administration (NASA) Fellowship, University of Puerto Rico (2005 2007)

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- Alfred P. Sloan Foundation Minority Scholar, University of Puerto Rico (2003 2006)
- Puerto Rico Louis Stokes Alliance for Minority Participation Bridge to the Doctorate Program Fellowship, University of Puerto Rico (2003 2005)
- Minority Access to Research Careers (MARC) Fellowship, University of Puerto Rico (2001 2002)

## SYNERGISTIC ACTIVITIES

- **Researcher:** (1) chemical education research focuses on how active learning as teaching strategy affect students' performance, retention, and perception of the General Chemistry course (UPR-Humacao, 2022 Present); (2) biomedical research focused on development and characterization of nanocarrier systems for targeted drug delivery (UPR-Humacao, 2017 Present)
- Research Mentor: training and mentoring undergraduate research students, 2005 Present
- **TADDEI Mentor:** Independent Studies Development Workshops mentor, Chemistry Department Program at UPR-Humacao, 1998 2002

## **COLLABORATORS**

- Wilson J. González-Espada, Ph.D.
  Professor of Physics and Science Education
  Department of Physics, Earth Science and Space Systems Engineering
  Morehead State University
  Morehead, KY 40351
- Yamixa Delgado, Ph.D. Assistant Professor Chair: Biochemistry & Pharmacology Department San Juan Bautista School of Medicine Caguas, PR 00726-4968

## GRANTS

- Grant Program: PR-INBRE Developmental Research Project Program Role: Principal Investigator Purpose: Small instrumentation awards for Primarily Undergraduate Institutions
- Grant Program: Puerto Rico Outstanding Undergraduate & Diversified (PROUD) Role: Collaborator
   Project: "Promoting -Inclusion- Through Active Learning to Improve Students' Performance and Perception of the General Chemistry Course".

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 Grant Program: PR-INBRE Developmental Research Project Program Role: Collaborator Project: "Effects of phytonutrients in resistance and metastasis in lung carcinoma".