

ACTIVITIES AND FINDING

RESEARCH AND EDUCATION ACTIVITIES:

THE BRIDGE-TO-THE-DOCTORATE PROGRAM-YEAR 2

The Bridge-to-the-Doctorate Program, designed by PR-LSAMP and successfully implemented during the past five years, includes the following components:

a. Stipends and Bonuses for Demonstrated Academic Progress. BD Fellows receive each year of the award a monthly stipend of \$1,500 and three bonuses of \$4,000 each (one in December, one in May and one in July) for excellence in academic performance, for a total annual fellowship of \$30,000 for two years. The BD Program also covers during this two-year period the Fellows' tuition costs, basic health insurance and basic institutional fees.

b. Travel Funds to Attend National Scientific Meetings/Conferences – BD Fellows receive \$1,500 in travel stipends per year to attend scientific conferences such as the annual meeting of the American Association for the Advancement of Science (AAAS), the American Chemical Society (ACS), or the American Physics Society. Table 1 in the Supplemental Documents Section presents the conferences attended by the Fellows. All Fellows will attend during year one of the fellowship, the national NSF/JAM Meeting.

c. Funds for Educational Materials – BD Fellows receive funds each year of the award for educational and lab materials (\$1,000 per year).

d. A Support Program to Enhance the Academic Preparation of BD Fellows In addition to the fellowship, Fellows participate in a Support Program to enhance their academic preparation and their integration into the BD initiatives to sustain the K-16+ educational pipeline. This program helps to ensure that BD Fellows successfully complete their first two years of graduate studies, and that they enroll, remain, and graduate from a doctoral program in a STEM field. Table 2 in the Supplemental Documents Section presents the different types of activities offered during the past year under the BD Support Program.

As part of the Support Program, BD Fellows participate in 12 to 16 4-hour seminars each year. Since attendance to all seminars is mandatory, topics and dates are selected by consensus by the Fellows and the BDP Coordinator. Speakers include internationally renowned scientists, local researchers, and industry representatives. Speakers also serve as role models as they share with participants their academic and professional development. These seminars are opened to all graduate STEM students at the institution. Also, Fellows from all cohorts attend annually the Puerto Rico Interdisciplinary Scientific Meeting (PRISM) and The Best Practices Conference on Teaching and Learning, sponsored by PR-LSAMP. Field trips are scheduled each year for Fellows of the last two cohorts. For example, Fellows from Cohorts #5 and #6 participated in a field trip to AMGEM Pharmaceuticals to know and understand the biochemical and bioengineering processes that are the current edge of the pharmaceutical

industry. Fellows from Cohort #6 participated in a second field trip to Cornell University where they visited the different research laboratories and participated of lectures given by researchers from this institution in order to establish networking.

e. Mentoring – Each BD Fellow serves as mentor to an undergraduate student participating in the PR-LSAMP Undergraduate Research Experiences Component. This strategy supports the PR-LSAMP system-wide approach to educational reform by linking all educational levels, and to integrating research and education.

f. BDP Fellows Visits to High Schools – BD Fellows visit public high schools to serve as role models for high school students. BD Fellows talk to the students about his/her academic experiences during their high school, undergraduate and graduate years, and about their future career plans. They give special emphasis to the role that undergraduate research experiences play in their academic preparation. As role models they motivate them to excel academically and exhort them to continue careers in STEM fields. Schools participating in the GK-12 program were included in these visits.

g. Presentations at the Puerto Rico Interdisciplinary Scientific Meeting (PRISM) - All BD Fellows present their research projects at PRISM, the largest annual local scientific forum sponsored by PR-LSAMP and the local chapter of the American Chemical Society.

h. Additional seminars and workshops offered by the STEM Departments and PR-AGEP.

Each STEM Department offers between 10 to 15 scientific seminars per semester to enhance students academic and research preparation. The Puerto Rico Alliance for Graduate Education and the Professoriate (PR-AGEP) offers activities that connect BD Fellows to the doctoral program. PR-AGEP students serve as mentors and role models to the BD Fellows, and Fellows participate in the two week AGEP Summer Bridging Program and the AGEP Peer Mentoring Program. The STEM Departments and PR-AGEP offer a Teaching Assistant (TA) Training Program to broaden and deepen TA teaching skills. This two-week summer seminar assists graduate students in preparing for the TA experience that occurs during the first year of studies. TAs engage in other activities throughout the year, including working with PR-LSAMP faculty in assessing and redesigning teaching/learning approaches and participating in faculty development workshops in teaching/learning. All TAs are encouraged to participate in teaching/learning workshops offered by the campus and to consider career opportunities in academia. Some BD Fellows as they enter their third year of studies, serve as AGEP mentors to incoming Fellows. Fellows also participate in the PR-EPSCoR Annual Conference, present their research projects in the poster session, and benefit from the Conference's activities.

The BD activities together with the on-going activities described above have proven essential to the preparation and success of our graduate students. Cohort #6 Fellows have been integrated into the established BD Program.

FINDINGS SECTION:

A sixth cohort of twelve BDP Fellows began graduate studies in August 2008, for a total of 70 BDP fellowships awarded by PR-LSAMP under this initiative. Ten (10) of twelve fellows have a GPA of 3.67 or higher; five of them with a GPA of 4.0 (see table 1 in attached PDF file).

All fellows approved their graduate courses with an average of thirty two credits per student at the end of the two year period (see table 1 in attached PDF file).

Fellows have benefited from ten workshops, thirty one Scientific Conferences and two Field Trips (see table 2-4 in PDF file).

All twelve fellows presented their research work in the Puerto Rico Interdisciplinary Scientific Meeting (PRISM).

24% of the Hispanics who received a Ph.D. nationwide in a natural science field, from 2003 to 2008, received their BS degree from a PR-LSAMP institution (NORC data).

21% of the Hispanics who received a Ph.D. nationwide in engineering, from 2003 to 2008, received their BS degree from a PR-LSAMP institution (NORC data).

The University of Puerto Rico awarded a total of 51 Ph.D. degrees in STEM fields in academic year 2008-09.

TRAINING AND DEVELOPMENT:

During academic year 2009-10 Fellows have benefited from ten workshops, twenty-five scientific conferences and two field trips. (see tables 2-4 in PDF file).

Outreach Activities:

Visits to High Schools : During year one of the program each BDP fellow visited a public high school to serve as a role model to these students. The visiting BDP fellow shares with students their high school and undergraduate experiences, including preferred courses, teachers and professors that were their role models, and insights on how to succeed in a university environment. But most importantly, they serve as role models to these high school students, and motivated them to pursue careers in STEM fields. Schools from the GK-12 program were included in these visits (see table 9 in PDF file).

During this academic year, BD Fellows participated as presenters in NanoDays, a national outreach event that brings nanoscience and technology to the general public. During this activity, BD fellows worked together with trained high school students offering interactive demonstrations in Nanotechnology to the general public impacting more than 5000 people.

WEB/INTERNET SITE:

www.prlsamp.org: The PR Bridge to the Doctorate program shares the PR-LSAMP website.

CONTRIBUTIONS

Contributions within Discipline:

BD Fellows visited 12 high schools to serve as role models and encourage students to pursue studies in STEM fields. More than 300 high school students benefited from this role model activity. Schools from the GK-12 program were included in these visits. (see table 9 in Findings PDF file).

During this academic year, BD Fellows participated as presenters in NanoDays, a national outreach event that brings nanoscience and technology to the general public. During this activity, BD fellows worked together with trained high school students offering interactive demonstrations in Nanotechnology to the general public impacting more than 5000 people.

Contributions to Other Disciplines:

N/A

Contributions to Human Resource Development:

If we track the baccalaureate origin of the nationwide PhD recipients, the National Opinion Research Center (NORC), which reports Ph.D. data, shows for the years 2003 to 2008 that:

24% of the Hispanics (U.S. citizens) that obtained a PhD in a Natural Science field nationwide, received their BS degree from a PR-LSAMP institution (367 out of 1,555). UPR-Rio Piedras and UPR-Mayaguez are the leading baccalaureate institutions of U.S. Hispanic Ph.D.'s in Science.

21% of the Hispanics that obtained a PhD in Engineering nationwide, received their BS degree from a PR-LSAMP institution (105 out of 511). UPR-Mayaguez is the leading baccalaureate institution of U.S. Hispanic Ph.D.'s in Engineering. Table 5 (in PDF file) shows the leading U.S. Baccalaureate Institutions of U.S. Hispanic Ph.D.'s in the natural sciences for the 2003-2008, and Table 6 for engineering fields.

At the local level, the University of Puerto Rico's three graduate institutions, UPR-Rio Piedras, UPR-Mayaguez, and UPR-Medical Sciences awarded 51 PhD degrees in science and engineering in 2008. Graduation data for 2009 will be

submitted as it becomes available. Table 7 presents the number of PhD degrees awarded by these three campuses in 2007-08 by science and engineering field. Table 8 presents the number of PhD degrees awarded by the three campuses from 1990 to 2008.

Contributions to Resources for Research and Education:

N/A

Contributions Beyond Science and Engineering:

N/A

TABLES TO BE INCLUDED AS ATTACHMENTS TO THE REPORT:

Table 1

COHORT VI:

ACADEMIC PROGRESS OF BD FELLOWS

NAME	STEM DISCIPLINE	NUMBER OF GRADUATE CREDITS APPROVED	GPA
Edgar Almodóvar	Mathematics	27	3.67
Sonia Avilés	Chemical Engineering	33	3.82
Rita Cáceres	Biology	27	4.00
Jennifer Carpena	Physics	32	3.90
Diana Delgado	Biology	31	4.00
Yamixa Delgado	Chemistry	29	3.20
Cielo Figuerola	Biology	30	4.00
Haydee Guzmán	Mathematics	45	3.16
María Ocasio	Biology	28	4.00
Nelson Rivera	Chemistry	30	3.71
Kennett Rivero	Chemistry	54	3.85
Diana Silva	Chemistry	23	4.00

Table 2**WORKSHOPS OFFERED 2008-10**

Title	Speaker
General Strategies to be Successful in Graduate School	Dr. Ana R. Guadalupe UPR – Río Piedras
Teaching Strategies and Techniques in Science Education	Dr. Lizzette Velázquez UPR – Río Piedras
System Dynamics an Holistic Approach	Prof. Joaquín Medín UPR – Bayamón
Computational Modeling Applied to Space Weather Analysis	BDP Students PR-LSAMP
Proposal Writing and the Search for Research Funds	Dr. Sandra Macksoud UPR – Río Piedras
Fourth Transdisciplinary Scientific Conference: Computational Modeling Applied to Biology and Material Science	Dr. Ricardo Cortés, Tulane University Dr. Juan Restrepo, University of Arizona Dr. Pablo Negrón, UPR-Humacao
An Introduction to the Nanoscience Discipline with Emphasis in Medical Research	Dr. Carlos Rinaldi UPR – Mayagüez
Strategic steps across the bridge to STEM carriers: Meetings & postdocs	Anson H. Hines Environmental Research Center Smithsonian Institution
Entrepreneurship in Puerto Rico	Dr. Manuel Figueroa Presidente de VERNET

Table 3**SCIENTIFIC CONFERENCES**

Title	Speaker
<p>Best Practices Annual Conference: Cognitive Research and Active Learning Student-Centered Active Learning Environment (SCALE-UP) From Expert-Novice Reasoning to Classroom Practice</p>	<p>Dr. Robert Beichner, North Carolina State University Dr. José Mestre, Urbana Champagne</p>
<p>Fermionic Atom Systems in Optical Traps</p>	<p>Dr. Jeremy Armstrong Lund Institute Sweden</p>
<p>Nonstationary Stochastic Dynamics and Polymerization Dynamics</p>	<p>Dr. Rigoberto Hernández Georgia Tech</p>
<p>The Science of Space Weather</p>	<p>Dr. Ramón López Texas University, Arlington</p>
<p>Using Chemical Tools to Make Sense of Molecular, Economic and Social Networks</p>	<p>Dr. Rigoberto Hernández Georgia Tech</p>
<p>Academic Outreach Conference Department of Chemistry and Chemical Biology Harvard University</p>	<p>Dr. Alán Aspuru Dr. Tobias Ritter Dr. Theodore Betley Dr. Alan Saghatelian</p>
<p>Combinatorics, Graph Theory and Computing: Connections and Interplay</p>	<p>Minerva Cordero Department of Mathematics University of Texas at Arlington</p>
<p>Structure-Guided Rational Engineering of Genetically- Encoded Fluorescent Biosensors</p>	<p>Eric Schreiter</p>
<p>Darwin and Wallace and The Origins of Species by Natural Selection</p>	<p>Miguel Angel Puig-Samper Institute of Historical Research Government of Spain</p>
<p>More than Pretty Pictures</p>	<p>Felice Frankell Harvard University</p>
<p>Landscape Ecology, Seed Dispersal and Frugivory</p>	<p>Dra. Carla Restrepo Diana Delgado</p>

Title	Speaker
Preparation and Optical Properties of Nanostructured Materials	Dr. Luis Fonseca Jennifer Carpena
Subcellular surgery and nanosurgery	Dr. Eric Mazur Physics Department Harvard University
Specialty Separations and Advanced Materials	Dr. David Suleiman Sonia Aviles
Population Ecology: Prey-Predator Interactions	Dr. Alberto Sabat Maria Ocasio
Tropical Limnology, Carbon and Nitrogen Cycling in Tropical Rivers and Estuaries, Ecohydrology of Urban Rivers	Dr. Jorge Ortiz Rita Caceres
Electrochemistry and Surface Science: Nanomaterials for Direct Methanol Fuel Cells and Li Batteries: Nanostructured Surfaces; Sensors and Surface Analysis	Dr. Carlos Cabrera Nelson Rivera
Inorganic Chemistry; Electrochemistry, Spectro-Electrochemistry, X-Ray Crystallography, Polynuclear Complexes, Metal-Metal Bonding, Metalloprotein Models, Small Molecule Activation	Dr. Raphael Raptis Kennett Rivero
Biochemistry and Biophysics: Protein Structure, Stability and Dynamics; Non-aqueous Enzymology; Protein Formulation; Drug Delivery	Dr. Kai Griebenow Yamixa Delgado
Supramolecular Chemistry, Molecular Recognition, Organic Synthesis, Nanotechnology, Bioorganic Chemistry, Medicinal Chemistry	Dr. Jose Rivera Diana Silva
Effects of Exotic Species on Plant Communities	Dr. Elvia Melendez Cielo Figuerola
Direct Inhibition of the Notch Transactivation Complex	James E. Bradner M.D. M. Sc. Harvard Medical School
Potentiometry in Gas Phase-Are You Kidding Me?	Jiri Janata Ph. D. Chemistry Department, Georgia Tech
Self-Organizing and Self-Sorting: How Nature Creates the New and How Chemists can Use these Concepts	Christoph A. Schalley Ph. D. Chemistry Department, Freie University Berlin, Germany
Nanostructure Materials For Sensors in Aerospace Application	Gary Hunter Ph. D. NASA Glenn Research Center
Neutron and X-Ray Scattering: Unique Structural Probes for Soft Matter Research	Danilo Pozzo Ph. D. Chemical Engineering Department, University of Washington
Catalysts and Nanostructures for Light-driven Catalytic Water Splitting	Craig L. Hill Ph. D. Emory University Chemistry Department

Title	Speaker
Food Webs Through River Networks	Mary Power Ph. D. Department of Integrative Biology, University of California at Berkeley
Vulnerability of Tropical Ectotherms to Climate Warming	Raymond B. Huey Ph.D. Biology Department, University of Washington
Migratory Fishes as Key Drivers of Tropical Stream Ecosystems	Alexander Flecker Ph. D. Biology Department, Cornell University
Stopping Trials of Inferiors Treatments Sooner Without Losing Statistical Power	John Cook Ph. D. MD Anderson Cancer Center Department of Biostatistics, University of Texas

Table 4

FIELD TRIPS

Site	Title
Cornell University	Introduction to Transdisciplinary Science at a Research One Institution
AMGEN Pharmaceuticals	Introduction to Biotechnology and Pharmaceutical Industrial Processes

Baccalaureate Graduates that Continue Graduate Studies

Table 5
Top 25 Baccalaureate Institutions of U.S. Hispanic PhDs (U.S. Citizens Only)
Natural Sciences 2003-08

Baccalaureate Origin Institution	Degrees Awarded	PR-LSAMP Institutions
University of Puerto Rico-Rio Piedras Campus	142	
University of Puerto Rico-Mayaguez	112	UPR-Rio Piedras = 142
University of California-Los Angeles	44	UPR-Mayaguez = 112
University of California-Berkeley	43	UPR-Humacao = 39
University of California-Davis	41	UPR-Cayey = 26
University of Puerto Rico-Humacao	39	UPR-Medical Sciences = 16
The University of Texas at Austin	38	Pontifical Catholic U. = 13
University of Florida	38	UIA = 13
New Mexico State University-Main Campus	37	UPR-Aguadilla = 6
University of Arizona	31	
University of California-San Diego	31	Total = 367
University of Miami	30	
Massachusetts Institute of Technology	29	
Texas A & M University	29	
University of California-Irvine	29	
Cornell University	26	
The University of Texas at El Paso	26	
University of New Mexico-Main Campus	26	
University of Puerto Rico at Cayey	26	
Florida International University	25	
Harvard University	25	
Rutgers University-New Brunswick	24	
The University of Texas at San Antonio	24	
University of California-Santa Cruz	22	
Princeton University	18	
Total Top 25 Institutions	955	
Total Doctorates Granted to Hispanics	1,555	

Source: NSF/NIH/USED/NEH/USDA/NASA, Survey of Earned Doctorates

Table 6
Top 23 Baccalaureate Institutions of U.S. Hispanic Ph.Ds (U.S. Citizens Only)
Engineering 2003-08

Baccalaureate Origin Institution	Degrees Awarded
University of Puerto Rico-Mayaguez	96
Massachusetts Institute of Technology	19
The University of Texas at El Paso	18
University of California-Berkeley	18
University of Florida	18
The University of Texas at Austin	11
New Mexico State University-Main Campus	10
Cornell University	9
Florida International University	9
Georgia Institute of Technology-Main Campus	9
Texas A & M University	9
University of Puerto Rico-Rio Piedras Campus	9
University of California-Davis	8
California Polytechnic State University-San Luis Obispo	7
Purdue University-Main Campus	6
University of California-San Diego	6
University of Illinois at Urbana-Champaign	6
University of New Mexico-Main Campus	6
Johns Hopkins University	5
Rensselaer Polytechnic Institute	5
Rutgers University-New Brunswick	5
University of Houston	5
University of Miami	5
Total Top 21 Institution	299
Total Research Doctorates in Engineering	511

Source: NSF/NIH/USED/NEH/USDA/NASA, Survey of Earned Doctorates

Table 7
Number of PhD Degrees Conferred in 2007-08 by UPR System

Institution	Number of PhD Degrees	Science and Engineering
UPR-Rio Piedras	26	Chemistry (10) Biology (10) Chemical Physics (6)
UPR-Medical Sciences	6	Microbiology (2) Biochemistry (4)
UPR-Mayaguez	19	Marine Sciences (2) Engineering (9) Chemistry (1) Computer Science (7)
Total	51	

Table 8
Number of PhD Degrees Conferred by the University of Puerto Rico
by Science and Engineering Field from 1990 to 2007

Academic Year	Number of PhD Degrees Conferred
1990	14
1991	9
1992	9
1993	17
1994	12
1995	10
1996	17
1997	16
1998	31
1999	22
2000	25
2001	36
2002	32
2003	30
2004	23
2005	31
2006	48
2007	29
2008	51
TOTAL	462

Table 9

VISITS TO HIGH SCHOOLS (2008-09)

NAME	SCHOOL
Edgar Almodóvar	Conchita Cuevas, Gurabo
Sonia Avilés	Escuela Vocacional Nueva, San Sebastián
Rita Cáceres	Manuel Martín Monserrate, Santa Isabel
Jennifer Carpena	Escuela Ramon Vila Mayo, Rio Piedras
Diana Delgado	Colegio de Lourdes, Hato Rey
Yamixa Delgado	Ana Roque de Duprey, Humacao
Cielo Figuerola	Ramón E. Rodríguez Díaz, Hormigueros
Haydee Guzmán	Colegio de Lourdes, Hato Rey
María Ocasio	Escuela Dr. Pedro Albizu Campos, Toa Baja
Nelson Rivera	Academia Santa Mónica
Kennett Rivero	Colegio de Lourdes, Hato Rey
Diana Silva	University Gardens High School*

*GK-12 School