



Myles and Sylvia Aaronson Professorship for the Center of Excellence in STEM Education

DR. CRISTINA VILLALOBOS

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Encouraging Curiosity and Discovery among STEM Students



Dr. Cristina Villalobos teaching at the University of Texas Rio Grande Valley in Edinburg, TX.

Dr. Cristina Villalobos brings a spark of curiosity and a thrill for learning to her classroom. Born and raised in the Rio Grande Valley (RGV), she passionately describes the need for more local students to pursue careers in science, technology, engineering and mathematics (STEM)—especially women and minorities. “We need more people in STEM—people who will come up with innovative ideas and push the frontiers of science,” she said. “Many times, women and minorities are not part of the conversation, but we need them. We need to show them the field is accessible, increase awareness, encourage them to continue.”

Dr. Villalobos holds the Myles and Sylvia Aaronson Professorship for the Center of Excellence in STEM Education at the University of Texas Rio Grande Valley (UTRGV). She is the founding director of the UTRGV Center of Excellence in STEM Education and a professor of mathematical and statistical sciences. While attending high school in Donna, TX, during two summers Dr. Villalobos took part in the Texas Pre-freshman Engineering Program (TexPREP) at what was then Pan American University. The TexPREP program, which continues today under UTRGV, fosters higher order thinking skills and innovation, providing students with the opportunity to collaborate with their peers and faculty in the STEM field. Dr. Villalobos draws from her experiences as a student in the program to provide her students with both a challenging and motivating curriculum.

It was after she attended the TexPREP program during her last two years of high school that Dr. Villalobos decided to attend college and major in mathematics. She received a Bachelor of Science in Mathematics from The University of Texas at Austin, followed by master’s and doctoral degrees in computational and applied mathematics from Rice University in Houston, TX.

Dr. Villalobos met her husband—who at the time was a mechanical engineering graduate student from Monterrey, Mexico—while at Rice University. When they started planning for a family, they decided to move home to the Rio Grande Valley where Dr. Villalobos accepted a tenure-track position at UTPA in 2001. Dr. Villalobos conducts interdisciplinary research in computer science, engineering, and mathematical biology, all of which revolve around her research area of optimization. She has published over 20 articles in peer-reviewed journals, spoken at national and international conferences, and received many prestigious awards. But, it’s her unrelenting desire to encourage young students to enter STEM fields for which she is best known. Due to her leadership in STEM education, Dr. Villalobos was invited to serve on a National Academies of Science, Engineering, and Medicine committee which published a recent 2019 study report on Minority Serving Institutions: *America’s Underutilized Resource for Strengthening the STEM Workforce*.

Sparking Life-Long Intellectual Curiosity

Dr. Villalobos is the founding director of the UTRGV Center of Excellence in STEM Education. It was one of three centers in the country funded by a grant from the U.S. Department of Defense, and the only one established at a Hispanic Serving Institution to receive the award. The center is focused on strengthening academic programs and facilitating faculty professional development. Faculty resources aid in improving teaching effectiveness and research capabilities. Students take part in development workshops, attend educational seminars, and network with professionals in their chosen field. Services are provided to assist students with summer research program applications, graduate school applications, and to search and apply for fellowships. Dr. Villalobos cites the significant effect that summer research programs had on her undergraduate educational journey, and she endeavors to incite the same profound outcome for students who attend workshops at the UTRGV Center of Excellence in STEM Education, with the ultimate goal to increase the number of women and minorities seeking PhDs in STEM.

The UTRGV Center of Excellence in STEM Education also focuses on K-12 outreach. Each year, over 16,000 students are exposed to hands-on STEM education through on-campus visits, the UTRGV mobile STEM laboratory, the UTRGV H-E-B planetarium, and the UTRGV portable planetarium. Through these outreach efforts, Dr. Villalobos and her colleagues aim to spark a life-long intellectual curiosity, while also increasing awareness about the advantages of a college education.

The center provides summer camps for K-12 students, with the goal of growing the quality and quantity of students that complete STEM degree programs. The imaginative and engaging learning experiences encourage a passion for STEM, allowing K-12 students to strengthen their understanding of STEM disciplines.

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Middle school students construct robots at a C-STEM summer camp hosted by UTRGV.



Young students conduct experiments during C-STEM summer camp hosted by UTRGV.

Dr. Villalobos channels her passion for and knowledge of STEM into her teaching methods at UTRGV. She challenges students to build their self-confidence through exploration and discovery. She creates an active learning environment in which they are comfortable and confident enough to ask questions, allowing them to solve challenging problems through patience and effort. Often referred to as guided discovery, this method of teaching facilitates deeper learning, based in a fundamental understanding of the subject matter, by allowing students to view the problem from multiple perspectives. The notion is that knowledge stems from questioning, exploring, and actively building understanding of a concept.

Employing innovative teaching methods is important to Dr. Villalobos. She has served on many UTRGV committees to develop and implement methods to improve student pass rates, optimize course scheduling, improve campus culture and climate, and further advance academic affairs. She says the most gratifying part of her job is coming up with ideas to help the university move forward in terms of student success.

Dr. Villalobos said, "There is a lot of opportunity here to implement new ideas to get our students to succeed. At the national level, where I serve on external advisory boards, I get to share ideas and information about our students. Or I see what is working at other schools, and I can try to bring it back to UTRGV to see if we can implement."



Tuesday night observation at the H-E-B Planetarium on the UTRGV campus in Edinburg, TX. The planetarium is open to the community every Tuesday evening for a fun and educational experience under the stars.



UTRGV students hear from Faraón Torres Lazos, an alumnus of UTRGV legacy institution UT Pan American. Torres is an engineer with Boeing, the world's largest aerospace company and leading manufacturer of commercial and military aircrafts.

Fostering Student Success

Dr. Villalobos' efforts both in and out of the classroom have been recognized nation-wide. In 2012, she received the Hispanic Engineer National Achievement Awards Corporation Luminary Award for Great Minds in STEM, followed by the Distinguished Undergraduate Institution Mentor Award from the Society for the Advancement of Chicanos and Hispanics and Native Americans in Science in 2013. She also received the University of Texas Regents' Outstanding Teaching Award in 2013. In 2016, she received the Outstanding Latina Faculty Service and



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Teaching Award from the American Association of Hispanics in Higher Education Service. In September 2019 she will receive The Richard A. Tapia Achievement Award for Scientific Scholarship, Civic Science, and Diversifying Computing from the Center for Minorities and People with Disabilities in Information Technology. This national-level award recognizes Villalobos for her contributions to scientific scholarship, STEM leadership and for helping to diversify the computing field.

Dr. Villalobos is proud to work at UTRGV, where she often sees the untapped potential of students in the community. As a champion for students, she works to provide opportunities and training that will foster their success. She said, "we have so many students with a lot of talent; they want to do more but they may not know there's much more they can do." She works tirelessly to show students what they are capable of, she encourages learning in imaginative ways, and helps them continue their education to Ph.D. programs. Dr. Villalobos is molding the next generation of mathematicians and educators.

Moreover, she emboldens students to take control of their future. "I tell students this a lot: take the initiative. Take the initiative in whatever you want to do. My mother would always tell me that people will not always come knocking on your door. You have got to go and knock on doors, ask questions, don't be shy. Go out there and ask what opportunities are there."