17th BUAP-UAMI-UTRGV-TAMIU Joint International Conference

Hosted by the Department of Mathematics and Physics
Sponsored by the College of Arts and Sciences

November 13-15, 2026 · Pellegrino Hall (PLG), Room 112, Laredo, Texas · Hybrid Mode

Book of Abstracts

Texas A&M International University
Laredo, TX 78041
2026

Schedule at a Glance Pellegrino Hall (PLG), Room 112

Friday, November 13, 2026

8:00 – 8:30 am	Registration and Opening Remarks
8:35 – 11:05 am	Session D1-S1
11:05 – 11:20 am	Coffee Break
11:20 am – 1:00 pm	Session D1-S2
1:00 – 2:00 pm	Lunch Break
2:00 – 3:15 pm	Session D1-S3
3:15 – 3:25 pm	Coffee Break
3:25 – 5:30 pm	Session D1-S4

Saturday, November 14, 2026

8:30 – 8:40 am	Opening Remarks
8:40 – 10:45 am	Session D2-S1
10:45 – 10:55 am	Coffee Break
10:55 am – 12:10 pm	Session D2-S2
12:10 – 1:05 pm	Lunch and Group Photo
1:05 – 3:10 pm	Session D2-S3
3:10 – 3:20 pm	Coffee Break
3:20 – 5:25 pm	Session D2-S4
5:30 – 6:00 pm	Planetarium Show: *Fronteras* (in Spanish), LBV Planetarium

Sunday, November 15, 2026

8:30 – 10:35 am	Session D3-S1
10:35 – 10:45 am	Coffee Break
10:45 am – 1:15 pm	Session D3-S2
1:15 pm	Closing Remarks, Group Photo and Lunch

Online Participation via Microsoft Teams

All sessions on all three days are streamed live through a single Microsoft Teams meeting. Online presenters and attendees may use the same link to join at any time during the conference.

Join: `teams.microsoft.com/meet/2255226721660942?p=RvDxXdz9G7HbotXTad`
Meeting ID: 225 522 672 166 094 2
Passcode: `Gs2aM7m6`

Online presenters are kindly asked to join 10 minutes before their session begins to test audio, video and screen sharing.

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Forewords

Foreword from the President



Dr. Christopher Maynard
President

Dear Conference Participants,

On behalf of Texas AM International University, I am pleased to welcome you to the 17th BUAP-UAMI-UTRGV-TAMIU Joint International Conference, November 13-15, 2026. We are honored to host this gathering and to welcome faculty, students, and researchers joining us in Laredo and online.

This conference reflects the power of sustained academic partnership. Through the collaboration of Benemérita Universidad Autónoma de Puebla, Universidad Autónoma Metropolitana Iztapalapa, The University of Texas Rio Grande Valley, and Texas A&M International University, we create opportunities to exchange ideas, advance research in mathematics and related fields, and build relationships across institutions and borders.

At TAMIU, our international mission is central to who we are. Our location on the United States-México border offers a daily reminder of the connections that enrich our communities and expand what we can accomplish together. Hosting this conference brings that mission to life through shared inquiry and discovery.

I am especially pleased that students have a meaningful place in this gathering. Presenting research, engaging with scholars, and exploring new approaches help students develop confidence and envision their own contributions to their fields. To our student participants: your questions, ideas, and perspectives are an essential part of this conference.

Thank you to our partner institutions, conference organizers, presenters, and participants for making this exchange possible. Your commitment sustains a partnership whose value extends well beyond these three days.

I wish you a productive and inspiring conference filled with thoughtful discussion, new connections, and opportunities for continued collaboration.

Go Dustdevils!

Dr. Christopher Maynard
President
Texas A&M International University

Foreword from the Dean



Dr. Marcus Antonius Ynalvez
Dean, College of Arts and Sciences

Dear Colleagues, Students, and Distinguished Guests,

On behalf of the College of Arts and Sciences at Texas AM International University, it is my pleasure to welcome you to the 17th BUAP-UAMI-UTRGV-TAMIU Joint International Conference.

This conference exemplifies the transformative power of international collaboration, scholarly inquiry, and the open exchange of ideas. By bringing together researchers, educators, students, and professionals from partner institutions across the United States and Mexico, this gathering creates opportunities to share knowledge, foster innovation, and build relationships that extend beyond institutional and national boundaries.

The College of Arts and Sciences is proud to support initiatives that advance excellence in research, scholarship, teaching, and community engagement. The work presented throughout this conference reflects the intellectual curiosity and commitment to discovery that drive progress across disciplines. Equally important, it provides students with invaluable opportunities to learn from accomplished scholars, engage with new perspectives, and participate in conversations that shape the future of their fields.

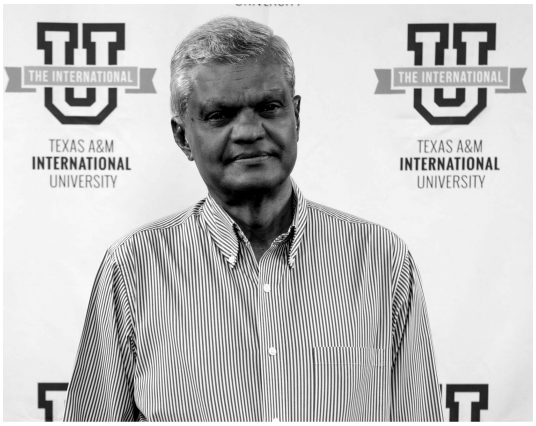
As a university located at the crossroads of cultures, economies, and ideas, TAMIU recognizes the importance of connecting academic knowledge with public relevance. The insights and collaborations generated through this conference have the potential to contribute not only to academic advancement, but also to the continued development of the Port of Laredo, the City of Laredo, South Texas, and the broader communities we serve. In an increasingly interconnected world, the solutions to regional challenges often emerge through partnerships that span local, national, and global networks.

This conference also reinforces TAMIU's growing reputation as a center for academic excellence and meaningful research. By fostering dialogue across institutions and disciplines, we strengthen our collective capacity to generate knowledge, address complex problems, and create positive impact.

I extend my sincere appreciation to the organizers, presenters, sponsors, and participants whose dedication has made this event possible. May this conference inspire new ideas, meaningful collaborations, and innovative solutions that continue to advance scholarship and benefit our communities.

Dr. Marcus Antonius Ynalvez
Dean, College of Arts and Sciences
Texas A&M International University

In Memoriam



Dr. Rohitha Goonatilake

The Local Organizing Committee respectfully dedicates this book of abstracts to the memory of Dr. Rohitha Goonatilake, who passed away on October 1, 2026, while serving as Chair of the Department of Mathematics and Physics.

Dr. Goonatilake joined the faculty of Texas A&M International University in 1999 and led the Department of Mathematics and Physics as Chair for nearly two decades. Throughout his distinguished career, he was dedicated to academic excellence, student success, and the advancement of the mathematical sciences at TAMIU and in the South Texas region.

His vision and support were instrumental in bringing the BUAP-UAMI-UTRGV-TAMIU Joint International Conference to TAMIU. His commitment to teaching, scholarship, and service will continue to inspire his colleagues and students.

Schedule of Sessions

Schedule of Sessions by Speaker and Title

All times are Central Time (UTC-6). Each talk is 20 minutes followed by 5 minutes of Q&A. † Online presentation. Click **Abstract** to jump to the abstract.

08:00–08:30 Registration and Opening Remarks

D1-S1: Applied Mathematics

Friday, November 13; Time: 08:35–11:05; Location: Pellegrino Hall (PLG), Room 112
Moderator: Nam Nguyen (UTRGV)

08:35–09:00 **Mike Lindstrom**† [UTRGV] Abstract
A Delayed, Stochastic Model of Prion Diseases with Interconnectome Protein Transport

09:00–09:25 **Omar Sharif (S)**† [UTRGV] Abstract
Oscillations in neuronal activity: a neuron-centered spatiotemporal model of the Unfolded Protein Response

09:25–09:50 **Dambaru Bhatta**† [UTRGV] Abstract
A Computational Phase-Field Framework for Crack Propagation in Transversely Isotropic Elastic Solids

09:50–10:15 **Erika Olivares (S)**† [UTRGV] Abstract
Semi-analytical methods for FitzHugh–Nagumo reaction–diffusion equation

10:15–10:40 **Saugata Ghosh (S)**† [UTRGV] Abstract
Modeling Crack-Induced Thermoelastic Fields in Transversely Isotropic Strain-Limiting Solids

10:40–11:05 **Mahanthesh Basavarajappa** [TAMIU] Abstract
Onset and Subcritical Behavior of Double-Diffusive Convection in Tridisperse Porous Media

11:05–11:20 Coffee Break

D1-S2: Pure Mathematics

Friday, November 13; Time: 11:20–13:00; Location: Pellegrino Hall (PLG), Room 112
Moderator: Eun Yoon Ann (UTRGV)

11:20–11:45 **Pavel Ramos Martínez**† [UAMI] Abstract
Invertibility on weighted vector-valued continuous function algebras

11:45–12:10 **Jhonatan Saúl López Beltran (S)**† [BUAP] Abstract
Investigations into Generalized Integration

12:10–12:35 **Josué Ivan Rios Cangas**† [UAMI] Abstract
C_0-Semigroups Generated by Domain-Multivalued Orthogonal Linear Relations

12:35–13:00 **Denisse Amélie Sophie Bernès Carmona (S)**† [BUAP] Abstract
Completeness of Trigonometric Systems on Arbitrary Frequency Range

13:00–14:00 Lunch Break

D1-S3: Statistics and Applied Probability

Friday, November 13; Time: 14:00–15:15; Location: Pellegrino Hall (PLG), Room 112
Moderator: Dr. César Contreras (TAMIU)

14:00–14:25 **Hongwei Wang** [TAMIU] Abstract
Suppression-Like Effects in Logistic Modeling of STEM Participation: Engagement and Self-Efficacy as Correlated Predictors

14:25–14:50 **Mirzobedil Dzhamolzoda (S)** [TAMIU] Abstract
Socioeconomic Determinants of Health Insurance Coverage and Health Outcomes Across Texas Counties

14:50–15:15 **Carlos James Gonzalez (S)** [TAMIU] Abstract
Actuarial Analysis of Life Insurance Premiums Using Applied Probability and Python

15:15–15:25 Coffee Break

D1-S4: Analysis, Operator Theory and Numerical Methods

Friday, November 13; Time: 15:25–17:30; Location: Pellegrino Hall (PLG), Room 112
Moderator: Dr. Azucena Herrera (UTRGV)

15:25–15:50 **Francisco Javier Mendoza Torres**† [BUAP] Abstract
Generalized Integration and Regular Convergence of Improper Integrals in $\mathbb{R}^2$

15:50–16:15 **Alma Yasmin Luciano Gerardo (S)**† [BUAP] Abstract
Hypercyclicity and d-Hypercyclicity of Tridiagonal Toeplitz Operators

16:15–16:40 **Karen Yagdjian**† [UTRGV] Abstract
Propagation of Dirac spherical waves in the expanding universe

16:40–17:05 **Runchang Lin** [TAMIU] Abstract
Local Convergence for C^0 Interior Penalty Approximation of Biharmonic Problems

17:05–17:30 **Vanessa Sperling (S)** [TAMIU] Abstract
FFNN vs. PINN: Which Neural Network Solves Differential Equations Better?

17:30 End of Day 1

08:30–08:40 Opening Remarks

D2-S1: Operator Algebras and Real Analysis

Saturday, November 14; Time: 08:40–10:45; Location: Pellegrino Hall (PLG), Room 112
Moderator: Mr. Juan J. Arellano, Jr. (TAMIU)

08:40–09:05 **Lourdes Palacios** [UAMI] Abstract
On right Complemented Algebras and their left Multiplier Algebra

09:05–09:30 **Gerardo Alfonso Sánchez Márquez (S)** [BUAP] Abstract
Examples to illustrate the Peano derivative

09:30–09:55 **Víctor Eduardo San Martín Macías (S)** [UAMI] Abstract
The multiplier algebra on some classes of topological algebras

09:55–10:20 **Slavisa Djordjevic** [BUAP] Abstract
From Approximation Theory to Operator Theory

10:20–10:45 **Carlos Signoret** [UAMI] Abstract
The second dual algebra of certain Topological Algebras

10:45–10:55 Coffee Break

D2-S2: Applied Mathematics and Math Education

Saturday, November 14; Time: 10:55–12:10; Location: Pellegrino Hall (PLG), Room 112
Moderator: Dr. Mahanthesh Basavarajappa (TAMIU)

10:55–11:20 **Xiaohui Wang** [UTRGV] Abstract
Perception Operators and Response Surfaces: Students' Views of Parental STEM Involvement and Math Intention

11:20–11:45 **Zhaosheng Feng** [UTRGV] Abstract
Parabolic System of Aggregation Formation in Bacterial Colonies

11:45–12:10 **Vesselin Vatchev** [UTRGV] Abstract
Periodic Solutions on the Circle for Shallow-Water Model

12:10–13:05 Lunch and Group Photo

D2-S3: Operator Theory and Data Science

Saturday, November 14; Time: 13:05–15:10; Location: Pellegrino Hall (PLG), Room 112
Moderator: Dr. César Contreras (TAMIU)

13:05–13:30 **Jasang Yoon** [UTRGV] Abstract
Two-way connections between 1-variable and 2-variable weighted shifts

13:30–13:55 **Jorge Ricardo Bolaños Servín**† [UAMI] Abstract
G-circulant structure in Quantum Markov Semigroups

13:55–14:20 **Ivan Moises Roque Tlatelpa**† [UPAEP] Abstract
Generalized diagonal of linear relations

14:20–14:45 **Tamer Oraby**† [UTRGV] Abstract
Measurement Error in Machine Learning

14:45–15:10 **Anahit Galstyan**† [UTRGV] Abstract
Semilinear Klein-Gordon equation in space-time of black hole

15:10–15:20 Coffee Break

D2-S4: Applied Mathematics, Statistics and Education

Saturday, November 14; Time: 15:20–17:25; Location: Pellegrino Hall (PLG), Room 112
Moderator: Miguel Contreras Martinez (Laredo College)

15:20–15:45 **Dacun Li** [LC] Abstract
Challenges of Teaching Technology at a High School and Solutions

15:45–16:10 **Karla Linero-Reyes (S)** [TAMIU] Abstract
Does Inertia Matter? Onset of Double-Diffusive Convection in a Darcy Porous Medium

16:10–16:35 **David Alexandro Figueroa (S)** [TAMIU] Abstract
A Categorical Data Analysis on College Graduates Participating in the Labor Workforce

16:35–17:00 **Michael Edmund Gutierrez (S)** [TAMIU] Abstract
Relationships Among Web Accessibility, Content Governance, and User Engagement: A Multivariate Statistical Approach

17:00–17:25 **Kristel Rochell Herrera (S)** [TAMIU] Abstract
Applying Linear Discriminant Analysis to Higgs Boson Signal Identification in Simulated Proton-Proton Collisions

17:30–18:00 LBV Planetarium Show: *Fronteras* (Borders)

Description: A journey to discover that boundaries are blurred. Giordano Bruno spoke of infinite worlds, Emmanuel Kant of island universes, and modern physics of the multiverse. We have only one certainty: it is our knowledge that has limits. But the joy we can derive by breaking through our limits in our search for answers, is infinite.

Language: Spanish **Length:** 29 minutes **Topics:** Astronomy/Cosmology **Fee:** FREE for conference attendees
Location: LBV Planetarium, Texas A&M International University

18:00 End of Day 2

D3-S1: Analysis and Probability

Sunday, November 15; Time: 08:30–10:35; Location: Pellegrino Hall (PLG), Room 112
Moderator: Dr. Hongwei Wang (TAMIU)

08:30–08:55 **Enrique Díaz-Ocampo (S)**† [UAEM] Abstract
The Haseman Boundary Value Problem with Shifts on Pure Cusp Stars

08:55–09:20 **Netzahualcóyotl Castañeda-Roldán**† [BUAP] Abstract
Ultrametrics, weak ultrametrics, and extended ultrametrics

09:20–09:45 **John Villavert**† [UTRGV] Abstract
On Sobolev-type embeddings and supercritical problems

09:45–10:10 **Alfredo Reyes Vazquez**† [BUAP] Abstract
About integration of functions in $\mathbb{R}^2$

10:10–10:35 **Mrinal Kanti Roychowdhury**† [UTRGV] Abstract
Optimal Quantization for Probability Distributions

10:35–10:45 Coffee Break

D3-S2: Applied Mathematics, Statistics and Applications

Sunday, November 15; Time: 10:45–13:15; Location: Pellegrino Hall (PLG), Room 112
Moderator: Dr. Hongwei Wang (TAMIU)

10:45–11:10 **Eleftherios Gkioulekas** [UTRGV] Abstract
The hydroxychloroquine controversy for COVID-19: A review of the statistical evidence

11:10–11:35 **Hyung Won Kim** [UTRGV] Abstract
Intuition-Grounded Instruction in Introductory Statistics: Findings from a Pilot Survey of Instructors

11:35–12:00 **Erwin Suazo** [UTRGV] Abstract
On explicit solutions for systems of partial differential equations with variable coefficients through Riccati-type systems

12:00–12:25 **Camilo Abarca Estrada (S)**† [BUAP] Abstract
The region of visibility over the Sun from a given point of the Earth surface and an Integral for determining the radiation emmited

12:25–12:50 **Moisés Soto Bajo**† [BUAP] Abstract
Revisiting Shannon's Information Theory in the Context of Numerical Finite Signals

12:50–13:15 **José Daniel Torres Campos (S)**† [BUAP] Abstract
Some Approximation Results for a Generalized Szász–Mirakyan Operator

13:15 Closing Remarks, Group Photo and Lunch

List of Participants

List of Participants by Organization

The University of Texas Rio Grande Valley (UTRGV)

Eun Yoon Ann
Dambaru Bhatta
Zhaosheng Feng
Anahit Galstyan
Saugata Ghosh
Eleftherios Gkioulekas
Azucena Herrera
Hyung Won Kim
Mike Lindstrom
Nam Nguyen
Erika Olivares
Tamer Oraby
Mrinal Kanti Roychowdhury
Omar Sharif
Erwin Suazo
Vesselin Vatchev
John Villavert
Xiaohui Wang
Karen Yagdjian
Jasang Yoon

Texas A&M International University (TAMIU)

Juan J. Arellano, Jr.
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Karla Linero-Reyes
Vanessa Sperling
Hongwei Wang

Laredo College

Miguel Contreras Martinez
Dacun Li

Universidad Autónoma Metropolitana–Iztapalapa (UAMI)

Jorge Ricardo Bolaños Servín
Lourdes Palacios
Pavel Ramos Martínez
Josué Ivan Rios Cangas
Víctor Eduardo San Martín Macías
Enrique Díaz-Ocampo
Carlos Signoret
Ivan Moises Roque Tlatelpa

Benemérita Universidad Autónoma de Puebla (BUAP)

Slavisa Djordjevic
Camilo Abarca Estrada
Denisse Amélie Sophie Bernès Carmona
Netzahualcóyotl Castañeda-Roldán
Jhonatan Saúl López Beltran
Alma Yasmin Luciano Gerardo
Francisco Javier Mendoza Torres
Alfredo Reyes Vazquez
Gerardo Alfonso Sánchez Márquez
Moisés Soto Bajo
José Daniel Torres Campos

Abstracts of Talks

D1-S1: Applied Mathematics

Friday, November 13, 2026 · 08:35–11:05 · Pellegrino Hall (PLG), Room 112
Moderator: Nam Nguyen (UTRGV)

A Delayed, Stochastic Model of Prion Diseases with Interconnectome Protein Transport

Speaker: Mike Lindstrom (online)
Affiliation: The University of Texas Rio Grande Valley
Time: Friday, November 13, 08:35–09:00

Prion diseases are rapidly fatal neurodegenerative disorders characterized by the misfolding of the endogenous Cellular Prion Protein ($\mathrm{PrP^C}$) into a toxic variant known as Scrapie Prion Protein ($\mathrm{PrP^{Sc}}$). These toxic proteins spread throughout the brain, converting $\mathrm{PrP^C}$ into more $\mathrm{PrP^{Sc}}$. In this presentation, we build a model starting with heterodimer protein kinetics and incorporate three key biological elements: (i) stochasticity, to account for randomness and uncertainty in prion clearance; (ii) the Unfolded Protein Response (UPR), a cellular defense mechanism that halts protein translation after a delay; and (iii) the capacity for toxic proteins to spread between different brain connectomes. Through an asymptotic limit, we establish a nonlinear, delayed, stochastic ordinary differential system that tracks the concentration of $\mathrm{PrP^{Sc}}$ within one or multiple brain regions. We demonstrate the global existence and positivity of solutions and explore qualitative outcomes, including conditions for disease persistence or extinction, as well as the emergence of Hopf bifurcations.

Oscillations in neuronal activity: a neuron-centered spatiotemporal model of the Unfolded Protein Response

Speaker: Omar Sharif (online)
Co-Authors: Elliot M. Miller, Tat Chung D. Chan, Carlos Montes-Matamoros, Laurent Pujo-Menjouet, Michael R. Lindstrom
Affiliation: The University of Texas Rio Grande Valley
Time: Friday, November 13, 09:00–09:25

Many neurodegenerative diseases (NDs) are characterized by the slow spatial spread of toxic protein species in the brain. The toxic proteins can induce neuronal stress, triggering the Unfolded Protein Response (UPR), which slows or stops protein translation and thus indirectly reduces the toxic load. However, the UPR may also trigger processes leading to apoptotic cell death and the UPR is implicated in the progression of several NDs. In this paper, we develop a novel mathematical model to describe the spatiotemporal dynamics of the UPR mechanism for prion diseases. Our model is centered around a single neuron, with representative proteins P (healthy) and S (toxic). The model takes the form of a coupled system of nonlinear reaction-diffusion equations with a delayed, nonlinear flux for P. Through the delay, we find parameter regimes that exhibit oscillations in the P and S protein levels. We find that oscillations are more pronounced when the S clearance rate and S diffusivity are small in comparison to the P clearance rate and P diffusivity, respectively. The oscillations become more ubiquitous as delays in initiating the UPR increase. In the model system, decreasing the production of P, increasing the clearance of S, and reducing the recruitment rate appear to be the most powerful mechanisms to reduce the mean UPR intensity and eventually moderate the disease progression.

A Computational Phase-Field Framework for Crack Propagation in Transversely Isotropic Elastic Solids

Speaker: Dambaru Bhatta (online)
Co-Authors: Saugata Ghosh, S. M. Mallikarjunaiah
Affiliation: The University of Texas Rio Grande Valley
Time: Friday, November 13, 09:25–09:50

A phase-field framework is presented to model crack growth in transversely isotropic solids with a linear constitutive law. The coupled displacement and phase-field equations are solved using the continuous Galerkin finite element method within a unified computational domain. The approach avoids explicit crack tracking and naturally captures crack initiation and propagation. Numerical simulations illustrate crack evolution and the corresponding stress and strain fields for fibers oriented along the x- and y-axes.

Semi-analytical methods for FitzHugh–Nagumo reaction–diffusion equation

Speaker: Erika Olivares (online)
Co-Authors: Vesselin Vatchev
Affiliation: The University of Texas Rio Grande Valley
Time: Friday, November 13, 09:50–10:15

The FitzHugh–Nagumo (FHN) reaction–diffusion system is a simplified mathematical model of excitable media, including nerve axons. In this talk, we consider the initial-value problem for its traveling-wave reduction. We derive a recursive procedure for computing the Taylor coefficients and establish convergence of the resulting series on a sufficiently small interval. We then extend the construction over successive adjacent intervals by using the endpoint values as initial data for the next interval.

Modeling Crack-Induced Thermoelastic Fields in Transversely Isotropic Strain-Limiting Solids

Speaker: Saugata Ghosh (online)
Affiliation: The University of Texas Rio Grande Valley
Time: Friday, November 13, 10:15–10:40

In this talk, we present the thermo-mechanical response of cracked transversely isotropic strain-limiting elastic solids subjected to localized point-source heating. The strain-limiting model permits large stresses while keeping strains bounded near the crack tip. A one-way coupling is considered, where the temperature field is first computed and then incorporated into the nonlinear mechanical problem. Numerical results illustrate how the location and intensity of the heat source influence the crack-tip stress, strain, and energy-density fields.

Onset and Subcritical Behavior of Double-Diffusive Convection in Tridisperse Porous Media

Speaker: Mahanthesh Basavarajappa
Affiliation: Texas A&M International University
Time: Friday, November 13, 10:40–11:05

In this talk, we present a stability analysis of double-diffusive convection in a tridisperse porous medium. The model couples three Darcy-type momentum equations for the macro-, meso-, and micro-pore phases with equations for heat and solute transport. We discuss the linear instability and nonlinear energy stability thresholds, both computed with a Chebyshev spectral collocation method. We also present a Ginzburg–Landau amplitude equation derived from a weakly nonlinear analysis, which describes heat and mass transport. The results show that interphase momentum transfer and permeability ratios delay the onset of convection. They also reveal a subcritical instability region that linear theory cannot detect.

D1-S2: Pure Mathematics

Friday, November 13, 2026 · 11:20–13:00 · Pellegrino Hall (PLG), Room 112
Moderator: Eun Yoon Ann (UTRGV)

Invertibility on weighted vector-valued continuous function algebras

Speaker: Pavel Ramos Martínez (online)
Affiliation: Universidad Autónoma Metropolitana–Iztapalapa, Mexico
Time: Friday, November 13, 11:20–11:45

In this talk, we consider the concepts of a Nachbin family V defined on a completely regular Hausdorff space X and of weighted vector-valued continuous function algebras, usually denoted by $CV_{(0)}(X, A)$, where A is a locally convex algebra. We explain why these algebras provide a suitable framework to study algebras of vector-valued continuous functions equipped with different topologies. Furthermore, we explore algebraic and topological properties of X, V, and A that provide characterizations of invertible elements $f \in CV_{(0)}(X, A)$. This is achieved by defining a new kind of Gelfand transform that maps vector-valued functions $f \in CV_{(0)}(X, A)$ to complex-valued functions $\widetilde{f} \in CV_{(0)}(X \times \mathcal{M}(A))$, where $\mathcal{M}(A)$ denotes the carrier space of A. Finally, we apply these results to the study of the carrier space $\mathcal{M}(CV_{(0)}(X, A))$.

Investigations into Generalized Integration

Speaker: Jhonatan Saúl López Beltran (online)
Co-Authors: Francisco Javier Mendoza Torres
Affiliation: Facultad de Ciencias Físico Matemáticas, Benemérita Universidad Autónoma de Puebla, Mexico
Time: Friday, November 13, 11:45–12:10

Starting from the Henstock–Kurzweil Integral, some authors have defined other integrals that generalize this integral and those that preceded it, such as the Riemann Integral, the Improper Riemann Integral, and the Lebesgue Integral. Some of these new integrals are defined in terms of distributions that are related in some way to the Henstock–Kurzweil Integral, such as the Distributional Integral introduced by Erik Talvila [2], the Distributional Henstock–Kurzweil Integral introduced by Guoju Ye and Wei Liu [3], and the Distributional Integral developed by Ricardo Estrada [1]. In this talk, we will discuss the definition of a type of distributions that we will call “Extended Distributions”. These distributions allow us to extend the concept of a regular distribution using the Henstock–Kurzweil Integral, which we expect will enable us to define a new type of generalized integrals.

C_0-Semigroups Generated by Domain-Multivalued Orthogonal Linear Relations

Speaker: Josué Ivan Rios Cangas (online)
Affiliation: Universidad Autónoma Metropolitana–Iztapalapa, Mexico
Time: Friday, November 13, 12:10–12:35

We present a unified framework for one-parameter semigroups generated by linear relations in Hilbert spaces, emphasizing the role of domain-multivalued orthogonal (d.m.o.) relations. After reviewing basic facts on linear relations and their operator parts, we characterize dissipative, accumulative, anti-dissipative, and anti-accumulative classes through their operator components. Key structural results include von Neumann-type formulae and connections between resolvent powers of a relation and those of its operator part. The talk culminates by extending fundamental semigroup generation results to the multi-valued setting: closed relations generate uniformly continuous semigroups precisely when they are maximal d.m.o., and they generate strongly continuous semigroups exactly when they are densely d.m.o. with a positive ray in the regular set. We also state Hille–Yosida and Lumer–Phillips type theorems for linear relations, identifying maximal anti-accumulative relations as generators of contraction C_0-semigroups and anti-selfadjoint relations as generators of unitary semigroups.

Completeness of Trigonometric Systems on Arbitrary Frequency Range

Speaker: Denisse Amélie Sophie Bernès Carmona (online)
Co-Authors: Moisés Soto Bajo, Francisco Javier Mendoza Torres
Affiliation: Facultad de Ciencias Físico Matemáticas, Benemérita Universidad Autónoma de Puebla, Mexico
Time: Friday, November 13, 12:35–13:00

We are going to present some results concerning the completeness of trigonometric systems, when the frequencies are drawn from an arbitrary interval. Several function spaces are considered. First, we tackle the finite variable case, that is, we consider the vector space of n-tuples, an adequate framework for applications. Our main theorem shows that any element of this space can be expressed as a finite linear combination of discretizations of cosines, where the frequencies are arbitrarily concentrated. Next, similar questions will be considered in the Lebesgue spaces and the space of continuous functions with uniform norm, both when the variable is restricted to an interval of finite measure, and in the real line. The former situation will lead us to revisit classic works from G. Pólya, O. Szász, R. Paley and N. Wiener, and we will focus on giving a constructive proof of the completeness of systems made up of cosines with arbitrarily concentrated frequencies. We will finish with some comments in regards of the situation for functions with real variable, which will lead us to briefly treat the works of H. Bohr on almost periodic functions.

D1-S3: Statistics and Applied Probability

Friday, November 13, 2026 · 14:00–15:15 · Pellegrino Hall (PLG), Room 112
Moderator: Dr. César Contreras (TAMIU)

Suppression-Like Effects in Logistic Modeling of STEM Participation: Engagement and Self-Efficacy as Correlated Predictors

Speaker: Hongwei Wang
Co-Authors: Jasmin Ortiz, Orlando Patricio
Affiliation: Texas A&M International University
Time: Friday, November 13, 14:00–14:25

We examine how correlated psychosocial predictors alter coefficient interpretation in logistic models of STEM participation. Survey data from 223 students at Texas A&M International University were analyzed using exploratory factor analysis and sequential binary logistic regression. Exploratory engagement and self-efficacy composites showed good internal consistency (Cronbach's alpha $= 0.833$ and 0.809) and substantial correlation ($r = 0.698$). Engagement was positively associated with STEM participation when modeled alone ($B = 0.506$, $p = 0.009$), but its coefficient became negative after adjustment for self-efficacy ($B = -0.568$, $p = 0.047$). Self-efficacy remained strongly positive in the combined model ($B = 1.593$, $p < 0.001$). Adding engagement to self-efficacy improved in-sample fit (likelihood-ratio chi-square $= 4.13$, $p = 0.042$), although repeated stratified cross-validation showed little incremental predictive discrimination. An engagement-by-self-efficacy interaction was not supported ($p = 0.524$), and variance inflation factors were 1.95. The positive-to-negative reversal occurred in 96.5% of 5,000 bootstrap resamples, but the percentile interval for the adjusted engagement coefficient included zero. These findings illustrate a suppression-like sign reversal and emphasize the distinction between marginal and conditional associations. The cross-sectional design and exploratory measurement structure warrant cautious interpretation and independent replication.

Socioeconomic Determinants of Health Insurance Coverage and Health Outcomes Across Texas Counties

Speaker: Mirzobedil Dzhamolzoda
Affiliation: Texas A&M International University
Time: Friday, November 13, 14:25–14:50

Texas has the highest uninsured rate of any U.S. state, but the socioeconomic roots of that gap—and its downstream consequences for health outcomes—vary substantially across the state's 254 counties. This project uses county-level data from the County Health Rankings & Roadmaps 2025 Annual Data Release to examine this relationship through a two-stage multiple regression framework. The first model estimates the extent to which poverty, unemployment, median household income, and demographic composition predict the percentage of uninsured residents across Texas counties. The second model examines whether uninsured rate and access-to-care measures—primary care physicians, dentists, and mental health providers per capita—predict county-level premature death rate, treating the uninsured rate as a bridge variable linking the two stages. Descriptive statistics, correlation analysis, and OLS regression diagnostics (including variance inflation factors, residual analysis, and influence statistics) are conducted in SAS, with supplementary visualizations produced in R to satisfy a dual-software requirement. Results are expected to show that socioeconomic disadvantage is significantly associated with reduced insurance coverage, and that coverage gaps, independent of provider supply, are associated with worse population health outcomes. Findings are discussed in the context of county-level public health policy in Texas, along with limitations inherent to cross-sectional, ecological-level analysis.

Actuarial Analysis of Life Insurance Premiums Using Applied Probability and Python

Speaker: Carlos James Gonzalez
Affiliation: Texas A&M International University
Time: Friday, November 13, 14:50–15:15

Actuarial science applies mathematical and statistical principles, particularly probability theory, to evaluate financial risks associated with uncertain future events. Life insurance pricing is one application of applied probability, as it requires estimating the likelihood of death or survival and determining the expected financial obligations of an insurance company. This project explores the application of probability theory and actuarial mathematics in calculating life insurance premiums through the development of a Python-based calculator using publicly available Social Security life table data. The calculator incorporates fundamental actuarial concepts, including mortality probabilities, conditional survival probabilities, actuarial present values (APVs), life annuities, and the equivalence principle. Conditional probabilities are used to determine the likelihood that an individual survives or dies within a specified period, while expected values and financial discounting are applied to calculate the present value of future insurance benefits. The equivalence principle is then used to determine level annual net premiums by equating the expected present value of future premium payments with the expected present value of insurance benefits. The project considers both term and whole life insurance and examines how age, sex, policy duration, and interest rates influence premium calculations. The objective is to demonstrate how applied probability and actuarial mathematics can be combined with computational methods to quantify mortality risk and determine life insurance premiums.

D1-S4: Analysis, Operator Theory and Numerical Methods

Friday, November 13, 2026 · 15:25–17:30 · Pellegrino Hall (PLG), Room 112
Moderator: Dr. Azucena Herrera (UTRGV)

Generalized Integration and Regular Convergence of Improper Integrals in $\mathbb{R}^2$

Speaker: Francisco Javier Mendoza Torres (online)
Co-Authors: Alfredo Reyes, Moisés Soto
Affiliation: Facultad de Ciencias Físico Matemáticas, Benemérita Universidad Autónoma de Puebla, Mexico
Time: Friday, November 13, 15:25–15:50

In this work, we obtain some inclusion relations between the space of real-valued functions defined in the plane that are Henstock–Kurzweil integrable and the space of functions whose integrals converge in the regular sense. By endowing this latter space with the Alexiewicz norm, we show that it coincides with the space of functions whose integrals converge improperly in the Pringsheim sense but whose Alexiewicz norm is bounded.

Hypercyclicity and d-Hypercyclicity of Tridiagonal Toeplitz Operators

Speaker: Alma Yasmin Luciano Gerardo (online)
Co-Authors: Ronald Richard Jiménez-Munguía, Slavisa V. Djordjevic
Affiliation: Facultad de Ciencias Físico Matemáticas, Benemérita Universidad Autónoma de Puebla, Mexico
Time: Friday, November 13, 15:50–16:15

In this talk, we study the hypercyclicity of tridiagonal Toeplitz operators to extend our analysis to the concept of d-hypercyclicity. Finally, we apply these ideas to the tensor product of two tridiagonal Toeplitz operators.

Propagation of Dirac spherical waves in the expanding universe

Speaker: Karen Yagdjian (online)
Affiliation: The University of Texas Rio Grande Valley
Time: Friday, November 13, 16:15–16:40

The explicit formulas for the spherical solutions of the Dirac equation in the expanding universe will be given. The initial value of the solution can be, in particular, a wave function of the hydrogen-like atom or a spherical wave in the Minkowski space, that then propagates in the Friedmann–Lemaître–Robertson–Walker space-time, which is expanding with the de Sitter scale factor.

Local Convergence for C^0 Interior Penalty Approximation of Biharmonic Problems

Speaker: Runchang Lin
Co-Authors: Wenming He, Tian Tian, Huayi Wei, Zhimin Zhang
Affiliation: Texas A&M International University
Time: Friday, November 13, 16:40–17:05

We propose a new approach to investigate the local convergence of finite element approximations for biharmonic problems. We establish new local convergence results for second-order derivatives in the context of C^0 interior penalty finite element approximations. Most significantly, we achieve, for the first time, local convergence results for first-order derivatives of numerical solutions. Some numerical experiments have been provided to support theoretical findings.

FFNN vs. PINN: Which Neural Network Solves Differential Equations Better?

Speaker: Vanessa Sperling
Co-Authors: Mahanthesh Basavarajappa
Affiliation: Texas A&M International University
Time: Friday, November 13, 17:05–17:30

Neural networks are emerging as powerful, mesh-free solvers for differential equations. This work compares two approaches. Feedforward neural networks (FFNNs) learn from sampled solution data, while physics-informed neural networks (PINNs) embed the governing equations directly into their training loss. Both are implemented in Python on Google Colab and applied to a selection of differential equations, with the workflow presented step by step. Their accuracy, convergence and computational cost are compared against exact or reference solutions. The results reveal how adding physical laws to the training process changes performance and offer practical guidance on choosing the right network for a given problem.

D2-S1: Operator Algebras and Real Analysis

Saturday, November 14, 2026 · 08:40–10:45 · Pellegrino Hall (PLG), Room 112
Moderator: Mr. Juan J. Arellano, Jr. (TAMIU)

On right Complemented Algebras and their left Multiplier Algebra

Speaker: Lourdes Palacios
Affiliation: Universidad Autónoma Metropolitana–Iztapalapa, Mexico
Time: Saturday, November 14, 08:40–09:05

In the study of the algebra of left multipliers $M_l(A)$ of a topological algebra A, the existence of an approximate identity in A is crucial. In the normed case, it is known that in certain cases, this algebra is isomorphic (as topological algebras) to the corresponding algebra $M_l(L_A)$ of all left multipliers of the left regular representation algebra L_A. For a certain type of right complemented Banach algebras, the existence of the approximate identity and the above identification are satisfied. In this talk we discuss the extension of these results to the non-normed case. We provide a context of right-complemented topological algebras A, not necessarily normed, where A indeed has an approximate identity and its algebra $M_l(A)$ of left multipliers is isomorphic to $M_l(L_A)$.

Examples to illustrate the Peano derivative

Speaker: Gerardo Alfonso Sánchez Márquez
Affiliation: Benemérita Universidad Autónoma de Puebla, Mexico
Time: Saturday, November 14, 09:05–09:30

Peano derivatives are a generalization of the usual derivative that allows the study of functions which are not necessarily differentiable in the usual sense. In the classical context, if a function is n-times differentiable, then the $(n-1)$-th derivative is continuous. It is natural to think that something similar occurs with the Peano derivatives: if f is n-times Peano differentiable, are the derivatives of lower orders continuous? We'll show that this conjecture is false. Lastly, we'll consider a different notion of differentiation: The Ultimate Peano Derivative. An example suggested in [Svetic, 1998] will be presented, this example does not satisfy both conditions of the definition; after that, we will present an example in which both conditions are satisfied.

The multiplier algebra on some classes of topological algebras

Speaker: Víctor Eduardo San Martín Macías
Affiliation: Universidad Autónoma Metropolitana–Iztapalapa, Mexico
Time: Saturday, November 14, 09:30–09:55

The study of multipliers plays a central role in understanding the internal structure of various classes of algebras, with significant applications in Operator Theory and other branches of functional analysis. In this talk, I will present my Master's thesis. Throughout it, I will explore the notion of multiplier algebras within the framework of topological algebras, beginning with the classical case of Banach algebras. I will analyze the case when such an algebra has an identity element, or not, in relation to its multiplier algebra. I will present several results concerning multipliers in locally m-convex algebras, emphasizing their importance in describing the structure of these algebras.

From Approximation Theory to Operator Theory

Speaker: Slavisa Djordjevic
Co-Authors: J. D. Torres-Campos, N. Castañeda-Roldán
Affiliation: Benemérita Universidad Autónoma de Puebla, Mexico
Time: Saturday, November 14, 09:55–10:20

Positive linear operators constitute a classical and fundamental tool in approximation theory. In particular, Bernstein-type operators and Korovkin-type theorems provide a natural framework in which approximation can be interpreted as convergence of sequences of positive operators toward the identity. This perspective leads naturally to questions concerning the operator-theoretic and spectral behavior of such approximation processes. In this talk, we discuss the transition from positive approximation to operator theory. Starting with Bernstein operators, moment conditions, and Korovkin convergence, we consider the distinction between strong and norm convergence and its relevance to spectral stability. Newburgh's framework for spectral continuity provides a natural setting for studying Hausdorff convergence of spectra under norm perturbations. We also discuss convergence toward projections and the role of fixed-point and invariant structures in the asymptotic behavior of positive operators. These ideas motivate a further passage from spectral stability and invertibility to Fredholm theory, where invertibility is considered modulo compact operators. We conclude by indicating possible connections with generalized Fredholm structures and operator-valued frames. The main purpose is to illustrate how classical ideas from positive approximation theory lead naturally to questions concerning spectra, asymptotic operator behavior, and Fredholm-type stability.

The second dual algebra of certain Topological Algebras

Speaker: Carlos Signoret
Affiliation: Universidad Autónoma Metropolitana–Iztapalapa, Mexico
Time: Saturday, November 14, 10:20–10:45

Back in 1951, Richard Arens gave a procedure for defining a multiplication in the second conjugate space of a Banach algebra which makes that space into another Banach algebra. This fact has been used by many authors in different contexts to study normable and non-normable algebras. In this talk we examine the definition and construction of the Arens product in the setting of locally convex algebras A, namely, complete locally m-convex algebras for which every factor in its Arens–Michael decomposition is complete. We construct a suitable unital subalgebra C of the second dual algebra of such an algebra and prove that A embeds naturally in C.

D2-S2: Applied Mathematics and Math Education

Saturday, November 14, 2026 · 10:55–12:10 · Pellegrino Hall (PLG), Room 112
Moderator: Dr. Mahanthesh Basavarajappa (TAMIU)

Perception Operators and Response Surfaces: Students' Views of Parental STEM Involvement and Math Intention

Speaker: Xiaohui Wang
Co-Authors: Sergey Grigorian, Aaron Wilson, Mayra Ortiz Galarza
Affiliation: The University of Texas Rio Grande Valley
Time: Saturday, November 14, 10:55–11:20

Students' beliefs about their parents' STEM backgrounds may shape their own intentions toward mathematics, yet such beliefs need not reflect reality. We treat perception as an operator: a row-stochastic matrix K mapping each reference level of a parent's STEM involvement to a distribution over the levels the student reports, with the identity representing perfect perception. Distance from the identity measures distortion, the balance of probability above versus below the diagonal indicates overstatement or understatement, and contrasting the operators for mothers and fathers reveals whether perception differs by parent. Paired with response surface analysis, the framework also asks whether math intention depends on perceived levels, reference levels, or their agreement. We apply the framework to survey data from 1278 high school students, pairing their Likert ratings of each parent with reference levels classified from open-ended responses by a large language model, with bootstrap confidence intervals for the operator-based measures. The estimated operators for mothers and fathers and the corresponding response surfaces for math intention will be reported. The approach combines an interpretable operator-based description with standard statistical inference and extends to perception–reality gaps in which the reference measure is itself estimated, a setting increasingly common as LLM-derived measures enter social science research.

Parabolic System of Aggregation Formation in Bacterial Colonies

Speaker: Zhaosheng Feng
Affiliation: The University of Texas Rio Grande Valley
Time: Saturday, November 14, 11:20–11:45

In this work, we introduce a nonlinear parabolic system with dispersion to describe bacterial aggregation dynamics. In contrast to the corresponding model without dispersion, the inclusion of dispersion permits the propagation of bacterial clusters, indicating that dispersion can act as a regulatory mechanism for bacterial colony behavior. An analytical expression for the traveling-wave solution is derived by explicitly accounting for the dispersion coefficient. Numerical simulations further demonstrate that an initially random bacterial concentration evolves into a periodic wave pattern, which subsequently transitions into a stationary solitary wave in the absence of dispersion.

Periodic Solutions on the Circle for Shallow-Water Model

Speaker: Vesselin Vatchev
Affiliation: The University of Texas Rio Grande Valley
Time: Saturday, November 14, 11:45–12:10

In this talk, we consider the nonlinear Cauchy–Poisson problem describing the nonstationary motion of a perfect fluid with a free boundary and a solid bottom represented by a circle of large radius. The problem is associated with a two-dimensional model of atmospheric gravity waves generated by a polar vortex. A striking example of such phenomena is the atmospheric jet stream at Saturn's north pole, which follows a hexagonal path. Using Lagrange's method, we introduce a stream function and derive a second-order approximation of the system. For the resulting equations in a traveling-wave setting, we develop an algorithm to construct approximate solutions on the entire domain. We establish convergence and stability results that allow approximation to arbitrary precision. Finally, we present simple trigonometric approximate solutions, including a traveling wave that resembles a hexagonal pattern on the circle.

D2-S3: Operator Theory and Data Science

Saturday, November 14, 2026 · 13:05–15:10 · Pellegrino Hall (PLG), Room 112
Moderator: Dr. César Contreras (TAMIU)

Two-way connections between 1-variable and 2-variable weighted shifts

Speaker: Jasang Yoon
Affiliation: The University of Texas Rio Grande Valley
Time: Saturday, November 14, 13:05–13:30

For this work, we study a two-way bridge between 1-variable and 2-variable weighted shifts. Starting from a unilateral weighted shift, we can construct a 2-variable weighted shift, while a homogeneous compression takes a 2-variable weighted shift back to a unilateral one. Our main interest is to understand which operator-theoretic properties, such as quasinormality, subnormality, and hyponormality, are preserved or reflected under these constructions.

G-circulant structure in Quantum Markov Semigroups

Speaker: Jorge Ricardo Bolaños Servín (online)
Affiliation: Universidad Autónoma Metropolitana–Iztapalapa, Mexico
Time: Saturday, November 14, 13:30–13:55

Quantum Markov semigroups (QMS) are one of the main tools that model evolution of open quantum systems. A QMS is said to be G-circulant when its generator commutes with the regular representation of a finite (or compact) group G acting on the underlying Hilbert space. This symmetry, inherited from the structure of G-circulant matrices, imposes a rigid algebraic structure on the Kraus operators and on the generator's Gorini–Kossakowski–Sudarshan–Lindblad (GKSL) form. In this talk I will show how the representation theory of G block-diagonalizes the semigroup via the Fourier transform on $\ell_2(G)$, reducing the study of the full dynamics to a family of lower-dimensional, more tractable semigroups indexed by the irreducible representations of G.

Generalized diagonal of linear relations

Speaker: Ivan Moises Roque Tlatelpa (online)
Co-Authors: Slavisa Djordjevic
Affiliation: Universidad Popular Autónoma del Estado de Puebla (UPAEP), Mexico
Time: Saturday, November 14, 13:55–14:20

The generalized diagonal of an operator opens up the possibility of studying the spectral properties of the operator T in terms of its restriction to an invariant subspace and the corresponding operator induced on the quotient space. These two operators form what is known as the generalized diagonal of T. In this talk, we extend this construction to linear relations. We present the quotient relation and the generalized diagonal associated with a closed linear relation. We will discuss its fundamental properties and examine the relationships among the spectra of the linear relation, its restriction, and its quotient linear relation.

Measurement Error in Machine Learning

Speaker: Tamer Oraby (online)
Co-Authors: Zeinab Mohamed
Affiliation: The University of Texas Rio Grande Valley
Time: Saturday, November 14, 14:20–14:45

Modern data pipelines and procedures often contain measurement errors, yet their effects on machine-learning predictions and interpretation are frequently overlooked. We examine how four common error types affect predictive accuracy and permutation-based feature importance. The four types are classical measurement error, feature misclassification, Berkson error from model- or algorithm-driven assignments, and group-level summary assignment error. Our findings show that measurement error generally reduces predictive performance and can significantly misrepresent feature importance and ranking. The impact varies by error type, severity, the machine learning method, and the prediction task. These results emphasize that measurement error can undermine both model accuracy and interpretability, even in well-tuned models. Overall, our study highlights the importance of detecting and addressing measurement error before assessing model robustness, generalizability, or feature importance.

Semilinear Klein-Gordon equation in space-time of black hole

Speaker: Anahit Galstyan (online)
Affiliation: The University of Texas Rio Grande Valley
Time: Saturday, November 14, 14:45–15:10

In this talk we consider the propagation of waves in the space-time of a single black hole with a static Schwarzschild radius in the expanding universe, namely, the solutions of the linear and semilinear Klein–Gordon equations.

D2-S4: Applied Mathematics, Statistics and Education

Saturday, November 14, 2026 · 15:20–17:25 · Pellegrino Hall (PLG), Room 112
Moderator: Miguel Contreras Martinez (Laredo College)

Challenges of Teaching Technology at a High School and Solutions

Speaker: Dacun Li
Affiliation: Laredo College
Time: Saturday, November 14, 15:20–15:45

Various dual-credit courses have been taught at a high school. In the presentation, multiple challenges will be discussed and solutions will be shared with the audience. Challenges include lack of knowledge, attitudes, and behavior. Several methods to tackle the challenges were used at the high school and their effectiveness will be evaluated. The experience may help other educators who will teach college courses at high schools.

Does Inertia Matter? Onset of Double-Diffusive Convection in a Darcy Porous Medium

Speaker: Karla Linero-Reyes
Co-Authors: Kristel Rochell Herrera, Mahanthesh Basavarajappa
Affiliation: Texas A&M International University
Time: Saturday, November 14, 15:45–16:10

Double-diffusive convection in porous media arises in geothermal reservoirs, CO_2 sequestration and contaminant transport. This study extends an existing Darcy model of double-diffusive convection in a fluid-saturated porous layer by adding an inertia term to the momentum equation. The governing equations are nondimensionalized, the basic conductive state is determined, and linear stability analysis via normal modes yields criteria for the onset of stationary and oscillatory convection. The results are compared with the classical Darcy model to show how inertia affects stability. This comparison clarifies when inertial effects must be retained in modeling convective instabilities in porous media.

A Categorical Data Analysis on College Graduates Participating in the Labor Workforce

Speaker: David Alexandro Figueroa
Affiliation: Department of Mathematics and Physics, Texas A&M International University
Time: Saturday, November 14, 16:10–16:35

This study will focus on the statistical analysis of college graduates and their labor force status. There are over 71 million college graduates living in the United States as of 2023. The data analysis presents the demographic makeup of these college graduates by several categories including by broad occupation, race, and ethnicity, provided by the National Survey of College Graduates as of 2023 (NCSES 2025). Labor force status alongside its characteristics is compared various broad occupation types alongside race and ethnicity to provide the total responses per defined category. The data provided will be utilized to determine a correlation (Conover, 1999) of college graduates participating within the labor workforce and identify any patterns found within the data. Logistic regression will be the primarily model to design, utilizing binomial and multinomial formulas and inputs, constructing chi-square values in the process. The findings may contribute to determine whether labor-force participation differs from the highest degree earned; additionally, to also consider if the current workforce environment is providing opportunities for college graduates to find and maintain employment.

Relationships Among Web Accessibility, Content Governance, and User Engagement: A Multivariate Statistical Approach

Speaker: Michael Edmund Gutierrez
Affiliation: Texas A&M International University
Time: Saturday, November 14, 16:35–17:00

Higher education institutions increasingly depend on complex web ecosystems to deliver information, services, and resources to students, faculty, staff, and external stakeholders. As website management becomes decentralized across academic and administrative units, maintaining consistent standards for accessibility, content governance, and digital quality becomes increasingly difficult. This study investigates the relationships among web accessibility, content governance, and user engagement within a higher education web environment using a multivariate statistical framework. The objective is to identify factors most strongly associated with digital quality and provide data-driven recommendations for improving institutional web governance practices. The study utilizes webpage-level analytics collected from a web ecosystem and incorporates engagement variables. Future phases will integrate accessibility and governance metrics. Multivariate statistical techniques are proposed to examine relationships among variables, identify underlying quality dimensions, and detect unusual observations. By examining accessibility, governance, and user engagement simultaneously rather than independently, the study seeks to provide a comprehensive understanding of digital quality in higher education websites.

Applying Linear Discriminant Analysis to Higgs Boson Signal Identification in Simulated Proton-Proton Collisions

Speaker: Kristel Rochell Herrera
Affiliation: Texas A&M International University
Time: Saturday, November 14, 17:00–17:25

The aim of this study is to use linear discriminant analysis (LDA) discriminating between the Higgs Boson Signal and background noise in proton-proton collision events. This study uses simulated data from the Open Data CERN website. The dataset is composed of kinematic variables that can be seen in particle collision events. Histograms are used to verify the distribution of kinematic variables. Linear Discriminant Analysis was used to classify background noise and Higgs Boson Signal from proton-proton collision events (Agresti 2013). The model showed an 89.90% linear adjustment. In linear discriminant analysis the aim is to reduce the number of variables to identify the variables that best classify, in this case whether an event is background noise or Higgs Boson Signal.

D3-S1: Analysis and Probability

Sunday, November 15, 2026 · 08:30–10:35 · Pellegrino Hall (PLG), Room 112
Moderator: Dr. Hongwei Wang (TAMIU)

The Haseman Boundary Value Problem with Shifts on Pure Cusp Stars

Speaker: Enrique Díaz-Ocampo (online)
Co-Authors: Yuriy Karlovych
Affiliation: Centro de Investigación en Ciencias (CInC), Universidad Autónoma del Estado de Morelos (UAEM), Mexico
Time: Sunday, November 15, 08:30–08:55

We consider the Haseman boundary value problem with shifts on a pure cusp star in the setting of weighted Lebesgue spaces. The underlying contour consists of finitely many branches meeting at a common first-order cusp, while the boundary condition involves a branch-preserving shift and slowly oscillating coefficient data. The boundary value problem is reduced to an associated singular integral operator with shift. Using explicit parametrizations of the cusp branches, we transform this operator into a system of model operators on the positive half-line. The resulting representation separates the contributions arising from individual branches from the interactions between distinct branches and provides a convenient framework for applying Wiener–Hopf and Mellin operator techniques. We also discuss Fredholm properties of auxiliary shifted operators arising from the diagonal part of the model and their role in the analysis of the original problem.

Ultrametrics, weak ultrametrics, and extended ultrametrics

Speaker: Netzahualcóyotl Castañeda-Roldán (online)
Affiliation: Facultad de Ciencias Físico Matemáticas, Benemérita Universidad Autónoma de Puebla, Mexico
Time: Sunday, November 15, 08:55–09:20

The strong triangle inequality defining an ultrametric can be relaxed first by introducing a uniform multiplicative constant, and then by allowing the multiplicative factor to depend on the endpoints. This leads, respectively, to the notions of weak ultrametric and extended ultrametric. A natural question is whether these classes of distance functions really are larger, and under what conditions they become equivalent. In this talk, we show that both inclusions are proper. For the first one, we present a family of weak ultrametrics induced by strictly increasing real functions, and these weak ultrametrics fail to be ultrametrics. We then prove that every extended ultrametric with a bounded control function is weak; in particular, every extended ultrametric on a finite set is a weak ultrametric. Finally, using eventually constant sequences over a three-element alphabet, we construct an extended ultrametric that is not a weak ultrametric.

On Sobolev-type embeddings and supercritical problems

Speaker: John Villavert (online)
Affiliation: The University of Texas Rio Grande Valley
Time: Sunday, November 15, 09:20–09:45

In this talk, we will discuss some sharp geometric inequalities and a closely-related class of nonlinear partial differential equations (PDEs). We shall briefly discuss their connection to renowned problems from analysis and geometry as well as review both known classical results and open questions (mostly pertaining to the existence and non-existence of positive solutions to the related nonlinear PDEs). We shall then describe our recent work establishing new supercritical and higher-order variants of Sobolev-type embeddings and new existence results for a more general class of nonlinear equations. If time permits, we will outline key ideas of our framework and the methods for obtaining our results, which utilizes both variational and non-variational techniques.

About integration of functions in $\mathbb{R}^2$

Speaker: Alfredo Reyes Vazquez (online)
Affiliation: Facultad de Ciencias Físico Matemáticas, Benemérita Universidad Autónoma de Puebla, Mexico
Time: Sunday, November 15, 09:45–10:10

In this presentation we will discuss the relationships between the different definitions of convergence of integrals in two variables. In particular, we will deal with convergence in the Pringsheim sense, Regular and the extension of the concept of Henstock integration which is well known on the real line but which has a different behavior in several variables.

Optimal Quantization for Probability Distributions

Speaker: Mrinal Kanti Roychowdhury (online)
Affiliation: The University of Texas Rio Grande Valley
Time: Sunday, November 15, 10:10–10:35

Quantization for probability distributions refers to the approximation of a given probability distribution by a discrete probability distribution supported on a set containing no more than n points, where n is a positive integer. The goal is to determine an optimal discrete approximation with respect to a suitable distortion measure. This problem has important applications in areas such as signal processing, data compression, numerical integration, and approximation theory. In this talk, I will introduce the basic concepts of optimal quantization for probability distributions, discuss the associated optimization problem, and present some representative examples and results illustrating the structure of optimal quantizers.

D3-S2: Applied Mathematics, Statistics and Applications

Sunday, November 15, 2026 · 10:45–13:15 · Pellegrino Hall (PLG), Room 112
Moderator: Dr. Hongwei Wang (TAMIU)

The hydroxychloroquine controversy for COVID-19: A review of the statistical evidence

Speaker: Eleftherios Gkioulekas
Affiliation: School of Mathematical and Statistical Sciences, The University of Texas Rio Grande Valley
Time: Sunday, November 15, 10:45–11:10

At the onset of the COVID-19 pandemic, as early as March 2020, a hydroxychloroquine/azithromycin combination therapy was proposed by Raoult and colleagues (IHU, Marseilles, France) based on preliminary viral clearance results. In the United States, this treatment protocol was further enhanced into a hydroxychloroquine, azithromycin, zinc triple-drug therapy by Dr. Vladimir Zelenko (Kiryas Joel, NY, USA) with early reports of positive outcomes, and subsequently evolved into the sequenced McCullough protocol. In this talk, I will review the statistical evidence that emerged from both Zelenko and Raoult, supporting the efficacy of hydroxychloroquine-based combination therapies, when initiated early at the onset of infection, and my involvement in some of these studies. I will also comment on a meta-analysis of Indian studies on the prophylactic use of hydroxychloroquine and zinc and some of the controversies that have emerged.

Intuition-Grounded Instruction in Introductory Statistics: Findings from a Pilot Survey of Instructors

Speaker: Hyung Won Kim
Co-Authors: Ho Kyoung Ko
Affiliation: The University of Texas Rio Grande Valley
Time: Sunday, November 15, 11:10–11:35

This exploratory pilot study examines how 14 college introductory statistics instructors use intuition-grounded instruction (IGI) to build formal statistical understanding. A survey assessed three dimensions: eliciting informal reasoning, using intuitive representations, and connecting intuition to formal methods. Instructors reported moderate use across all three, with the most use of connections to formal methods and the least use of intuitive representations. Responses varied most for eliciting reasoning and connecting it to formal methods. Instructors cited time, curriculum pacing, and assessment constraints. The findings identify areas for professional development and larger-scale research.

On explicit solutions for systems of partial differential equations with variable coefficients through Riccati-type systems

Speaker: Erwin Suazo
Affiliation: The University of Texas Rio Grande Valley
Time: Sunday, November 15, 11:35–12:00

This work focuses on the study of explicit solutions for generalized coupled reaction-diffusion, Burgers-type, and nonlinear Schrödinger equations (NLS) systems with variable coefficients, including nonlinear models with variable coefficients such as the diffusive Lotka–Volterra model, the Gray–Scott model, the Burgers equations. Also, we show the existence of rogue wave and dark–bright soliton-like solutions for a generalized NLS system, provided the coefficients satisfy a Riccati type system. The equations' integrability (via the explicit formulation of the solutions) is accomplished by using similarity transformations and requiring that the coefficients fulfill a Riccati system. We present traveling wave-type solutions as well as solutions with more complex dynamics and relevant features, such as bending.

The region of visibility over the Sun from a given point of the Earth surface and an Integral for determining the radiation emmited

Speaker: Camilo Abarca Estrada (online)
Co-Authors: Moisés Soto Bajo
Affiliation: Benemérita Universidad Autónoma de Puebla, Mexico
Time: Sunday, November 15, 12:00–12:25

For many purposes (Agriculture, Green Energy Technologies, etc.) the quantification of the emmited solar radiation (emmited by the visible region) is really desirable. It is also valuable for the study of viruses, epidemies, etc. In this talk it would be treated the problem of, first, determining what is the region of the Solar Globe, visible at a certain instant. In order to do that, the day is splitted in three parts. It is employed a Geometric-Dynamic model of the system Earth-Sun. Second, then it is possible to quantify the Solar radiation emmited as an integral over that region. This calculation is interesting specially around sunset and sunrise. Despite the fact, that the warm flux is by itself a highly complex phenomenon, it is only taken into account the emmited solar radiation.

Revisiting Shannon's Information Theory in the Context of Numerical Finite Signals

Speaker: Moisés Soto Bajo (online)
Affiliation: SECIHTI–Benemérita Universidad Autónoma de Puebla, Mexico
Time: Sunday, November 15, 12:25–12:50

In this talk I will expose a new approach on representing numerical finite signals. The focus will be posed on the definition and quantification of average information quantity needed in the representation process, assuming a codification system based on a specific basis being fixed. Also, we deal with an application on the design of lossy compression algorithms based on sparse representations of signals. This will lead us to the computation of integrals over hyperspheres. The case of orthonormal bases will be addressed. The relation with the classic Information Theory of Shannon will be discussed.

Some Approximation Results for a Generalized Szász–Mirakyan Operator

Speaker: José Daniel Torres Campos (online)
Affiliation: Benemérita Universidad Autónoma de Puebla, Mexico
Time: Sunday, November 15, 12:50–13:15

The classical Szász–Mirakyan operator was introduced in the study of approximation of functions on the nonnegative real axis by Mirakyan [1] and Szász [2]. In this work, we study a family of positive linear operators $L_n(f, x)$, introduced by Jorge Bustamante González in [3], which generalizes the classical Szász–Mirakyan operator. We present several results concerning the convergence and approximation properties of these operators. In particular, we discuss conditions under which convergence is obtained and provide estimates for the approximation error.

Logistic Information

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Conference Venue

All in-person sessions are held in **Pellegrino Hall (PLG), Room 112**, Texas A&M International University, 5201 University Blvd, Laredo, Texas 78041.

Online Participation

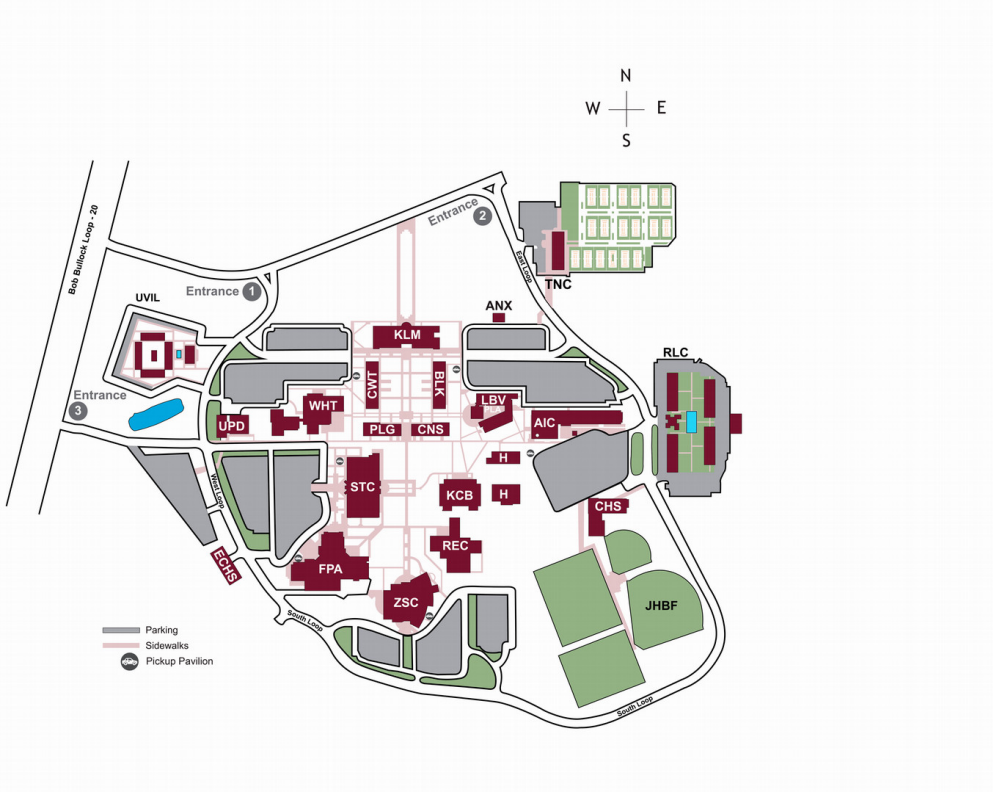
All sessions on all three days are streamed live through one Microsoft Teams meeting. Online participants may join at any time using the link below.

Join: `teams.microsoft.com/meet/2255226721660942?p=RvDxXdz9G7HbotXTad`
Meeting ID: 225 522 672 166 094 2
Passcode: `Gs2aM7m6`

Social Event: LBV Planetarium Show

On Saturday, November 14, from 17:30 to 18:00, conference attendees are invited to the planetarium show *Fronteras* (Borders), presented in Spanish at the LBV Planetarium, free of charge for conference attendees.

University Map



Internet Access Information

Internet access account information is available at the registration desk.

Travel Information and Directions

The address of Texas A&M International University is: 5201 University Blvd, Laredo, Texas 78041.

- The twin cities of Laredo, Texas and Nuevo Laredo, Mexico, situated on the banks of the Rio Grande, are collectively referred to as *Los Dos Laredos*. Laredo was founded in 1755 and celebrated its 250th anniversary in 2005.
- Laredo, with a population of about 257,600, has been governed under seven national flags. Nuevo Laredo has a population of over 400,000.
- The weather is moderate in winter months, around 68°F (20°C), but sizzling in mid-summer, around 100°F (38°C).
- Laredo is the commercial hub of the South Texas Plains and one of the fastest growing cities in the United States. It offers entertainment, education, and cultural resources that reflect its rich Hispanic heritage.
- Laredo is accessible by car via Interstate 35, and US Highways 59 and 83.
- Laredo International Airport (IATA: LRD; ICAO: KLRD) offers nonstop flights to Dallas/Fort Worth (American Airlines), Houston (United Airlines), and Las Vegas (Allegiant Air), as well as connections to Mexico.
- **Important:** Non-US citizens are required to carry immigration/traveling documents (such as a visa, passport, and/or Green Card) with them even if they do not plan on crossing the border into Nuevo Laredo, Mexico. There are immigration checkpoints on highways and at the airport of Laredo, where the U.S. Border Patrol will conduct checks to verify immigration status. US citizens are recommended to carry their passport with them.
- Parking on campus is free except in reserved parking lots. Additional parking information can be found at `http://www.tamiu.edu/adminis/police/trfrgs.shtml`.

Things to Do in Laredo

For attractions, events, dining, and maps, visit the official Laredo tourism website `https://visitlaredo.com` or download the *Visit Laredo* app.

- **Historic Downtown:** San Agustín Cathedral and the San Agustín de Laredo Historic District, the heart of old Laredo.
- **Republic of the Rio Grande Museum:** a museum on Laredo's history, offering guided and self-guided tours.
- **Laredo Center for the Arts:** art exhibitions housed in the historic former city hall and market building (El Mercado).
- **Lake Casa Blanca International State Park:** walking trails, picnicking, and bird watching.
- **Bird watching:** South Texas is a popular birding destination; look for the Great Kiskadee, Green Jay, White-tipped Dove, and Audubon's Oriole.
- **Shopping:** The Outlet Shoppes at Laredo (downtown, near the border) and Mall del Norte.
- **LBV Planetarium at TAMIU:** conference attendees are invited to the show *Fronteras* on Saturday, November 14, 5:30–6:00 PM.

Lodging

Each attendee shall make their own reservation, either by calling the hotel directly or through its website. A limited number of rooms at the following hotels have been reserved at a special rate.

- **Tru by Hilton Laredo Airport**
  7120 Rosson Lane, Laredo, TX 78041, 956-615-1675
  Block Dates: November 13–15, 2026
  Group Code: **2633**
  Booking window closes on November 2, 2026.
  Booking Link: https://group.trubyhilton.com/kbcvl5

- **La Quinta Inn & Suites by Wyndham Laredo Airport**
  7220 Bob Bullock Loop, Laredo, TX 78041, 956-724-7222
  Website: https://www.wyndhamhotels.com/laquinta/laredo-texas/la-quinta-laredo-airport/overview

  There are other choices of hotels in Laredo, Texas.

Name	Phone	Address
Holiday Inn Express	(956) 218-8888	7223 Bob Bullock Loop
Staybridge Suites	(956) 724-7222	7010 Bob Bullock Loop
Best Western San Isidro Inn	(956) 723-1600	1410 Hospitality Dr
Amerik Suites	(956) 725-5222	6551 Metro Ct
Homewood Suites by Marriott	(956) 753-9200	98 Calle Del Norte
Hampton Inn	(956) 717-8888	7903 San Dario
Residence Inn by Marriott	(956) 753-9700	310 Lost Oak Blvd
Days Inn	(956) 724-8221	7060 San Bernardo Ave
Fairfield Inn & Suites	(956) 722-4533	700 W Hillside Rd
Red Roof Inn	(956) 712-0733	1006 W Calton Rd

Local Organizers Contact Information

The Local Organizing Committee of the 17th BUAP-UAMI-UTRGV-TAMIU Joint International Conference consists of:

- Mahanthesh Basavarajappa (Chair), mbasavarajappa@tamiu.edu
- Runchang Lin, rlin@tamiu.edu
- Hongwei Wang, hongwei.wang@tamiu.edu

Acknowledgement

The 17th BUAP-UAMI-UTRGV-TAMIU Joint International Conference is sponsored by Texas A&M International University's (TAMIU) College of Arts and Sciences, Laredo, TX.

The 17th BUAP-UAMI-UTRGV-TAMIU Joint International Conference is also supported by the Department of Mathematics and Physics of TAMIU, the LBV Planetarium, the Graduate School, the Office of Admission, the Office of Community Relations and Special Events, the Office of Information Technology, the Office of Outreach and Precollege Programs, the Office of the Provost and Vice President for Academic Affairs, the Office of Recruitment and School Relations, the Office of the Vice President for Institutional Advancement, and the University Police Department of TAMIU.

We gratefully acknowledge our partner institutions, the Benemérita Universidad Autónoma de Puebla (BUAP), the Universidad Autónoma Metropolitana–Iztapalapa (UAMI), and The University of Texas Rio Grande Valley (UTRGV), for their continued collaboration and support of this conference series, which originated from the ConTex Collaborative Research Grant.