Julio C. Urenda Ph.D.

MATHEMATICIAN · ALGEBRA, ALGORITHM, LOGIC

☐ 915-996-1576 | ✉ jcurenda@utep.edu

"Mathematics, rightly viewed, possesses not only truth, but supreme beauty." - Bertrand Russell

Education

New Mexico State University (NMSU) *Las Cruces NM*

PH. D. IN MATHEMATICS *Aug. 2009 - May 2015*
- Dissertation: Algorithmic Aspects of the Embedding Problem
- Developed and implemented algorithms (in Macaualy2) for the study of algebraic space curves
- GPA: 4.0/4.0

The University of Texas at El Paso (UTEP) *El Paso TX*

M.S. IN COMPUTER SCIENCE *Aug. 2018 - (Expected)Dec 2022*
- Interests and research: Algebraic Methods for Computing
- GPA: 4.0/4.0

The University of Texas at El Paso (UTEP) *El Paso TX*

M.S. IN MATHEMATICS *Aug. 2007 - May 2009*
- Thesis: Multiplicative Riesz Decomposition on the Ring of Matrices over a Totally Ordered Field
- Developed and implemented algorithms (in Java) that completely characterized matrices with algebraic ordered properties
- GPA: 4.0/4.0

The University of Texas at El Paso (UTEP) *El Paso TX*

B.S. IN COMPUTER SCIENCE *Aug. 2003 - Jun 2007*
- Concentration: Mathematical Aspects of Computer Science
- Studied foundations of programming languages from the point of view of category theory
- GPA: 3.67/4.0

The Association of College and University Educators and the American Council on Education *El Paso TX*

CERTIFICATE IN EFFECTIVE COLLEGE INSTRUCTION *Aug. 2018 - May 2019*
- Designing an Effective Course and Class
- Establishing a Productive Learning Environment
- Using Active Learning Techniques
- Promoting Higher Order Thinking
- Assessing to Inform Instruction and Promote Learning

Book Chapters

- Julio C. Urenda, Olga Kosheleva, and Vladik Kreinovich, "Why Most Empirical Distributions Are Few-Modal", In: Nguyen Ngoc Thach, Doan Thanh Ha, Nguyen Duc Trung, and Vladik Kreinovich (eds.), Prediction and Causality in Econometrics and Related Topics, Springer, Cham, Switzerland, 2022, pp. 89-96.
- Julio C. Urenda, Olga Kosheleva, and Vladik Kreinovich, "How to Describe Measurement Errors: A Natural Generalization of the Central Limit Theorem Beyond Normal (and Other Infinitely Divisible) Distributions", In: Franco Pavese, Alistair B. Forbes, Nien Fan Zhang, and Anna G. Chunovkina (eds.), Advanced Mathematical and Computational Tools in Metrology and Testing XII, World Scientific, Singapore, 2021, pp. 418-428.
- Kevin Alvarez, Julio C. Urenda, and Vladik Kreinovich, "Why Class-D Audio Amplifiers Work Well: A Theoretical Explanation", In: Martine Ceberio and Vladik Kreinovich (eds.), How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies, Springer, Cham, Switzerland, 2021, pp. 15-20.
- Laxman Bokati, Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, "Why Immediate Repetition Is Good for Short-Term Learning Results but Bad For Long-Term Learning: Explanation Based on Decision Theory", In: Martine Ceberio and Vladik Kreinovich (eds.), How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies, Springer, Cham, Switzerland, 2021, pp. 27-35.
- Julio Urenda, Olga Kosheleva and Vladik Kreinovich, "Finitely Generated Sets of Fuzzy Values: If 'And' Is Exact, Then ''Or' Is Almost Always Approximate And Vice Versa", In: Martine Ceberio and Vladik Kreinovich (eds.), How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies, Springer, Cham, Switzerland, 2021, pp. 133–140.
- Julio Urenda, Olga Kosheleva and Vladik Kreinovich, "Fuzzy Logic Explains the Usual Choice of Logical Operations in 2-Valued Logic", In: Martine Ceberio and Vladik Kreinovich (eds.), How Uncertainty-Related Ideas Can Provide Theoretical Explanation for Empirical Dependencies, Springer, Cham, Switzerland, 2021, pp. 141-151.
- Vladik Kreinovich and Julio C. Urenda, "Computing Without Computing: DNA Version", In: Evgeny Katz (ed.), DNA- and RNA-Based Computing Systems, Wiley, Hoboken, New Jersey, 2021, pp. 213-230.

Journal Articles

- Francisco Avila, Julio Urenda, and Angel Zaldivar, "On the Cantor and Hilbert cube frames and the Alexandroff-Hausdorff theorem", Journal of Pure and Applied Algebra, 2022, Vol. 226, No. 5, pp 106919, https://doi.org/10.1016/j.jpaa.2021.106919.
- Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, "Geometric Explanation for an Empirical Formula Describing Our Galaxy's Warping", Geombinatorics, 2021, Vol. 30, No. 4, pp. 208-213.
- Laxman Bokati, Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, "Why Do We Need Two Doses of Covid-19 Vaccine: A Qualitative Explanation", Applied Mathematical Sciences, 2021, Vol. 15, No. 3, pp. 131-136.
- Julio C. Urenda, Olga Kosheleva, and Vladik Kreinovich, "So How Were the Tents of Israel Placed? A Bible-Inspired Geometric Problem", International Mathematical Forum, 2021, Vol. 16, No. 1, pp. 11-18.
- Kevin Alvarez, Julio C. Urenda, Orsolya Csiszar, Gabor Csiszar, Jozsef Dombi, Gyorgy Eigner, and Vladik Kreinovich, "Towards Fast and Understandable Computations: Which 'And'- and 'Or'-Operations Can Be Represented by the Fastest (i.e., 1-Layer) Neural Networks? Which Activations Functions Allow Such Representations?", Acta Polytechnica Hungarica, 2021, Vol. 18, No. 2, pp. 27-45.
- Julio C. Urenda, and Piotr J.Wojciechowski, "Matrix algebras with Multiplicative Decomposition Property", Linear Algebra and its Applications, 2011, Vol. 434, No. 4, pp. 931-943.
- Julio C. Urenda, Olga Kosheleva and Vladik Kreinovich, "Why Number of Color Difference Works Better In Detecting Melanoma Than Number of Colors: A Possible Fractal-Based Explanation", Applied Mathematical Sciences, 2020, Vol. 14, No. 17, pp. 811-815.
- Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, "Two Runners in the Time of Social Distancing, Speedboats in the Gulf of Finland: How to Best Pass?", International Mathematical Forum, 2020, Vol. 15, No. 7, pp. 317-323.
- Julio Urenda, Olga Kosheleva, Vladik Kreinovich, and Tonghui Wang, "COVID-19 Peak Immunity Values Seem to Follow Lognormal Distribution", Applied Mathematical Sciences, 2020, Vol. 14, No. 12, pp. 599-606.
- Julio C. Urenda and Vladik Kreinovich, "Why The Obvious Necessary Condition is (Often) Also Sufficient (TONCAS): An Explanation of the Phenomenon", Mathematical Structures and Modeling, 2019, Vol. 52, pp. 93-96.
- Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, "Why Derivative: Invariance-Based Explanation", Mathematical Structures and Modeling, 2019, Vol. 52, pp. 134-140.
- Julio Urenda, Nancy Avila, Nelly Gordillo, and Vladik Kreinovich, "Hierarchial Multiclass Classification Works Better Than Direct Classification: An Explanation of the Empirical Fact", Journal of Uncertain Systems, 2019, Vol. 13, No. 3, pp. 216-219.
- Julio Urenda, Francis Biney, Marco Cardiel, Perla De La O, Anthony DesArmier, Noa Dodson, Taylor Dodson, Sebastian Gonzalez, Laura Hinojos, Jorge Huerta, Ryan Jones, Oliver Martinez, Carlos A. Saldana Matamoros, Manuel Munoz, and Vladik Kreinovich, "How to Make Decisions: Consider Multiple Scenarios, Consult Experts, Play Down Emotions – Quantitative Explanation of Commonsense Ideas", Journal of Uncertain Systems, 2019, Vol. 13, No. 3, pp. 220-223.
- Julio C. Urenda and Vladik Kreinovich, "Why liquids? a symmetry-based solution to Weisskopf's challenge", Journal of Uncertain Systems, 2019, Vol. 13, No. 3, pp. 224-228.
- Julio C. Urenda and Vladik Kreinovich, "Why Experts Sometimes Do Not Perform Well in Unusual Situations", Mathematical Structures and Modeling, 2019, Vol. 51, pp. 109-113.
- Julio Urenda and Vladik Kreinovich, "In the Absence of Information, $1/n$ Investment Makes Perfect Sense", Applied Mathematical Sciences, Vol. 13, No. 12, pp. 585-589.
- Julio Urenda and Vladik Kreinovich, "Why Top Experts Are Paid So Much: Economics-Based Explanation", Applied Mathematical Sciences, 2019, Vol. 13, No. 12, pp. 591-594.
- Julio Urenda and Vladik Kreinovich, "When revolutions happen: algebraic explanation", Journal of Uncertain Systems, 2019, Vol. 13, No. 2, pp. 142-146.
- Julio Urenda and Vladik Kreinovich, "When revolutions happen: algebraic explanation", Journal of Uncertain Systems, 2019, Vol. 13, No. 2, pp. 142-146.
- Julio Urenda, Nancy Avila, Nelly Gordillo, and Vladik Kreinovich, "Which Fourier components are most informative: general idea and case studies", Journal of Uncertain Systems, 2019, Vol. 13, No. 2, pp. 138-141.
- Julio Urenda, Olga Kosheleva, Vladik Kreinovich, and Berlin Wu, "When Can We Simplify Data Processing: An Algorithmic Answer", Journal of Uncertain Systems, 2016, Vol. 10, No. 1, pp. 72-80.
- Julio Urenda, David Finston, and Vladik Kreinovich, "Once We Know that a Polynomial Mapping Is Rectifiable, We Can Algorithmically Find a Rectification", Mathematical Structures and Modeling, 2015, Vol. 36, pp. 67-73.
- John Symons, Julio C. Urenda, and Vladik Kreinovich, "Towards a General Description of Physical Invariance in Category Theory", Journal of Uncertain Systems, 2007, Vol. 1, No. 3, pp. 201-205.

Peer-Reviewed Conference Papers

- Julio C. Urenda, Orsolya Csiszar, Gabor Csiszar, Jozsef Dombi, Gyorgy Eigner, Olga Kosheleva, and Vladik Kreinovich, "Why Kappa Regression?", Proceedings of the Joint World Congress of International Fuzzy Systems Association and Biennial Conference of the European Society for Fuzzy Logic and Technology IFSA/EUSFLAT'2021, Bratislava, Slovakia, September 19-24, 2021, to appear.
- Julio Urenda, Martine Ceberio, Olga Kosheleva, and Vladik Kreinovich, "Why Homogeneous Membranes Lead to Optimal Water Desalination: A Possible Explanation", Proceedings of the 14th International Workshop on Constraint Programming and Decision Making CoProd'2021, Szeged, Hungary, September 12, 2021.
- Julio C. Urenda, Olga Kosheleva, and Vladik Kreinovich, "Dimension Compactification Naturally Follows from First Principles", Proceedings of the 14th International Workshop on Constraint Programming and Decision Making CoProd'2021, Szeged, Hungary, September 12, 2021.

- Julio C. Urenda, Christian Servin, Olga Kosheleva, and Vladik Kreinovich, "Mexican Folk Arithmetic Algorithm Makes Perfect Sense", In: Julia Rayz, Victor Raskin, Scott Dick, and Vladik Kreinovich (eds.), "Explainable AI and Other Applications of Fuzzy Techniques, Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2021, West Lafayette, Indiana, June 7-9, 2021", Springer, Cham, Switzerland, 2022, pp. 453-460.
- F. Niklas Schietzold, Julio Urenda, Vladik Kreinovich, Wolfgang Graf, and Michael Kaliske, "Why Ellipsoids in Mechanical Analysis of Wood Structures", Proceedings of the 9th International Workshop on Reliable Engineering Computing REC'2021, Taormina, Italy, May 16-20, 2021, pp. 604-614.
- Julio C. Urenda, Orsolya Csiszar, Gabor Csiszar, Jozsef Dombi, Olga Kosheleva, Vladik Kreinovich, and Gyorgy Eigner, "Why Squashing Functions in Multi-Layer Neural Networks", Proceedings of the 2020 IEEE International Conference on Systems, Man, and Cybernetics SMC'2020, Toronto, Canada, October 11-14, 2020, pp. 296-300.
- Julio Urenda, Olga Kosheleva, Martine Ceberio, and Vladik Kreinovich, "How Mathematics and Computing Can Help Fight the Pandemic: Two Pedagogical Examples", Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2020, Redmond, Washington, August 20-22, 2020.
- Julio C. Urenda, Orsolya Csiszar, Gabor Csiszar, Jozsef Dombi, Gyorgy Eigner, and Vladik Kreinovich, "Natural Invariance Explains Empirical Success of Specific Membership Functions, Hedge Operations, and Negation Operations", Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2020, Redmond, Washington, August 20-22, 2020.
- Julio Urenda, Manuel Hernandez, Natalia Villanueva-Rosales, and Vladik Kreinovich, "How User Ratings Change with Time: Theoretical Explanation of an Empirical Formula", Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2020, Redmond, Washington, August 20-22, 2020.
- Julio Urenda and Vladik Kreinovich, "Why a Classification Based on Linear Approximation to Dynamical Systems Often Works Well in Nonlinear Cases", Proceedings of the Annual Conference of the North American Fuzzy Information Processing Society NAFIPS'2020, Redmond, Washington, August 20-22, 2020.
- Michael Beer, Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, "Why Spiking Neural Networks Are Efficient: A Theorem", In: Marie-Jeanne Lesot, Susana Vieira, Marek Z. Reformat, Joao Paulo Carvalho, Anna Wilbik, Bernadette Bouchon-Meunier, and Ronald R. Yager (eds.), Proceedings of the 18th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems IPMU'2020, Lisbon, Portugal, June 15-19, 2020, pp. 59-69.
- Michael Beer, Julio Urenda, Olga Kosheleva, and Vladik Kreinovich, "Which Distributions (or Families of Distributions) Best Represent Interval Uncertainty: Case of Permutation-Invariant Criteria", In: Marie-Jeanne Lesot, Susana Vieira, Marek Z. Reformat, Joao Paulo Carvalho, Anna Wilbik, Bernadette Bouchon-Meunier, and Ronald R. Yager (eds.), Proceedings of the 18th International Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems IPMU'2020, Lisbon, Portugal, June 15-19, 2020, pp. 70-79.
- J. C. Urenda and O. Kosheleva, "How to reconcile physical theories with the idea of free will: From analysis of a simple model to interval and fuzzy approaches," 2008 IEEE International Conference on Fuzzy Systems (IEEE World Congress on Computational Intelligence), 2008, pp. 1024-1029, doi: 10.1109/FUZZY.2008.4630495

Thesis and Dissertation

- Urenda, J. C., 2015. Algorithmic Aspects of the Embedding Problem. Dissertation (PhD). New Mexico State University.
- Urenda, J. C., 2009. Multiplicative Riesz Decomposition on the Ring of Matrices over a Totally Ordered Field. Thesis (Ms). The University of Texas at El Paso.

Conferences & Workshops

2021 International Seminar on Computational Intelligence
Tijuana Institute of Technology

PRESENTER
August 2021
- Why Rectified Linear Activation Functions? Why Max-Pooling? A Possible Explanation

2021 BLAST Conference
New Mexico State University

PRESENTER
June 2021
- A Point-Free Version of the Alexandroff-Hausdorff Theorem

2021 NAFIPS Annual Conference
Purdue University

PARTICIPANT
June 2021
- Mexican Folk Arithmetic Algorithm Makes Perfect Sense

2020 IEEE International Conference on Systems, Man, and Cybernetics
Toronto Canada

PRESENTER
Oct 2020
- Why Squashing Functions in Multi-Layer Neural Networks

The 14th International Conference on Finite Fields and its Applications
SFU-Vancouver Canada

PRESENTER
June 2019
- Presentation Title: Covering Arrays as Algebraic Varieties

Google/CAHSI Problem Solving Workshop
PARTICIPANT
- Discussed on techniques to develop problem solving strategies for courses in Computer Science

Google-Austin TX
Jul. 2018

Macaulay2 workshop
DEVELOPER
- Developed software in applied algebraic geometry (numerical optimization and statistics).

Georgia Tech
Jul. 2017

CAHSI summit
ATTENDEE
- Networked with Computer Science Researchers and Employers.

San Juan Puerto Rico
Sep. 2015

Macaulay2 workshop
DEVELOPER
- Developed software in projective algebraic geometry (Versal Deformations)

Boise State University
May. 2015

Southwest Local Algebra Meeting
PRESENTER
- Dissertation

Texas A&M University
Mar. 2014

Macaulay2 workshop
DEVELOPER
- Developed software in algebraic curves and visualization.

The University of California-Berkeley
Jan. 2014

Experience

The University of Texas at El Paso
MATHEMATICS AND COMPUTER SCIENCE LECTURER
- Mentor and teach at both undergraduate and graduate levels on topics such as linear algebra, differential equations, discrete mathematics, numerical analysis, calculus I-III, and applied analysis, fundamentals of computing and logic
- Evaluate and grade students' class work, assignments, and papers.
- Advise students on mathematics curriculum, course transfers, substitutions and equivalencies as well as Spanish translations
- Keep abreast of developments and technological advances in the mathematics field.
- Conduct research in algebra and computing and publish findings in professional journals.
- Serve on academic or administrative committees that deal with institutional policies, departmental matters.

El Paso, TX
Aug. 2014 - PRESENT

New Mexico State University
GRADUATE ASSISTANT
- Mentor at the undergraduate level on topics such as algebra, differential equations, discrete mathematics, calculus, logic.
- Evaluate and grade students' class work, assignments, and papers.

Las Cruces, NM
Aug. 2009 - July. 2014

The University of Texas at El Paso
TEACHING ASSISTANT
- Mentor and teach at the undergraduate level on topics such as calculus, algebra, and automata theory.
- Evaluate and grade students' class work, assignments, and papers.

El Paso, TX
Aug. 2007 - May 2009

Computing Projects

Machine Learning
UTEP
- Develop and implement a NN to convert handwritten mathematical text into LaTeX.

El Paso, TX
Present

Covering Arrays
UTEP
- Develop and implement algorithms to construct covering arrays using methods from algebraic geometry.

El Paso, TX
Present

Operational Research
UTEP
- Implementing a cross entropy algorithm for the transportation problem (a known NP-hard problem) as well as initialization of experimental designs.

El Paso, TX
Present

Database System
UTEP
- Design and implement a database system to handle access to rooms in the Computer Science Building.

El Paso, TX
Fall 2018

Computational Algebraic Geometry   *Las Cruces, NM*

NMSU   *Spring 2015*
- Developed and implemented a minimal generating set algorithm for the ideal of a polynomial embedding of $k^{n-2} \to k^n$ and $k^{n-1} \to k^n$ for any given field k.

Extracurricular Activity

Putnam Competition   *El Paso, TX*

Coach   *Sep. 2017 - Pres.*
- Conducted seminar on problem solving in number theory, geometry, and combinatorics.
- Introduced general mathematical problem solving strategies.

Problem Solving and Programming Club   *El Paso, TX*

Founder   *Feb. 2017 - Dec. 2017*
- Conduct Problem Solving sessions where we brainstorm, design, and implement algorithmic solutions to problems in linear algebra, recursion, and group theory among others.
- Work on algorithms and data structures, we select a range of programming languages depending on the context; for example, C/C++ for numerical intensive computations, Haskell for descriptive problems, or JAVA for cryptography related problems.
- Gain experience in competitive programming, we use *HackerRank* as one of our platforms.

Peer-Review Activities

IEEE Symposium Series on Computational Intelligence   *Orlando, FL*

Peer Reviewer   *Dec 2021*

Frontiers in Applied Mathematics and Statistics   *El Paso, TX*

Review Editor   *2021 - Present*

Automation, Control and Intelligent Systems   *El Paso, TX*

Editorial Board Member   *2020 - Present*

Honors & Awards

Aug 2020 **Award**, Best Student Paper Award at the Annual Workshop on Constraint Programming and Decision Making CoProd'2020   *Redmond, WA*

2018-2019 **Scholarship**, Institutional Scholarship from the College of Engineering at UTEP   *El Paso, TX*

2009-2016 **Honors**, Perfect GPA as Graduate Student at NMSU   *Las Cruces, NM*

2012-2013 **Scholarship**, PROMEP *Secretaria de Educación Publica*   *Ciudad Juárez, Mexico*

2003-2004 **Dean's List**, Distinguished Student at UTEP   *El Paso, TX*

Skills

Programming Languages	JAVA (proficient), C/C++ (proficient), LaTeX (proficient), Haskell (familiar), Python (learning)
Mathematical Software/Languages	Matlab (proficient), Macaulay2 (proficient), Mathematica (familiar), Maple (familiar), R (learning)
Languages	English, Spanish
Social	Lead large heterogeneous groups, Form interdisciplinary research groups
Personal	Fast Learner, Analytical Thinker, Problem Solver