Francis Patricia Medina

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Professional Experience

8/2019–present Assistant Professor (tenure-track), Computer Science Department, Yeshiva College, Yeshiva University

Spring 2019 Semester Visiting Scholar, ICERM, Brown University

2016–2019 Postdoctoral Scholar, Worcester Polytechnic Institute

Summer 2015 Research Assistant, NSF-DMS 1115827 "Hybrid modeling in porous media", PI: Professor M. Peszynska

9/2014–5/2016 Instructor. Oregon State University

1/2012–6/2014 Graduate Research Assistant, Oregon State University, supported by NSF-DMS 1115827 "Hybrid modeling in porous media", PI: Professor M. Peszynska.

2009–2013 Teaching Assistant, Oregon State University

2006–2009 Teaching Assistant, Bowling Green State University

2003–2006 Instructor at Universidad Simón Bolívarand Universidad Central de Venezuela

Education

5/2014 Ph.D., Mathematics, Oregon State University
Dissertation: Mathematical Treatment and Simulation of Methane Hydrates and Adsorption Models.
Advisor: Dr. Malgorzata Peszyńska

5/2009 M.A., Mathematics, Bowling Green State University
Successful completion of written comprehensive examination based on Mathematical Analysis and Abstract Algebra

6/2003 M.S., Mathematics, Universidad de los Andes
Thesis: Non-complementarity of Orlicz spaces in $L^1[0,1]$ and $C[0,1]$.
Advisor: Dr. Diomedes Bárcenas

1/2001 B.Sc., Mathematics, Universidad Central de Venezuela
Thesis: Regression Analysis using local polynomials (non-parametric statistics)
Advisor: Dr. Ricardo Rios

Publications

Refereed publications

1. F. P. Medina and R. Paffenroth, Classification frameworks comparison on 3D point clouds, 2021 IEEE High Performance Extreme Computing Conference (HPEC), 2021, pp. 1-6, doi: 10.1109/HPEC49654.2021.9622842.

2. Medina F.P., Paffenroth R. (2021) Machine Learning in LiDAR 3D Point Clouds. In: Demir I., Lou Y., Wang X., Welker K. (eds) Advances in Data Science. Association for Women in Mathematics Series, vol 26. Springer, Cham. https://doi.org/10.1007/978-3-030-79891-8_6

3. F. Patricia Medina, *Machine Learning in Crowd Flow Exit Data*, Accepted, 2019 AWM Research Symposium Proceedings, Association of Women Mathematics Series.

4. Karamatou Yacoubou Djima, F. Patricia Medina, Linda Ness and Melanie Weber, *Heuristic Framework for Multi-Scale Testing of the Multi-Manifold Hypothesis* , pp. 47-80. In: Ellen Gasparovic and Carlotta Domeniconi (Eds.): Research in Data Science, Association of Women in Mathematics Series, Volume 17, Springer, 2019.

5. Anna Grim, Boris Iskra, Nianqiao Ju, Alona Kryshchenko, F. Patricia Medina, Linda Ness, Melissa Ngamini, Megan Owen, Randy Paffenroth, Sui Tang. *Analysis of Simulated Crowd Flow Exit Data: Visualization, Panic Detection, Exit Time Convergence, Attribution, and Estimation*, pp. 239-281. In: Ellen Gasparovic and Carlotta Domeniconi (Eds.): Research in Data Science, Association of Women in Mathematics Series, Volume 17, Springer, 2019.

6. F.P. Medina and M. Peszysnka, *Hybrid Modeling and Analysis of Multicomponent Adsorption with Applications to Coalbed Methane*, Porous Media: Theory, Properties, and Applications, Nova Science Publishers, Editor: Doris Wolfe. Chapter 1, pages 1-52, 2016, ISBN 978-1-63485-474-0

7. M. Peszynska, F. P. Medina, W. Hong, M. Torres, *Reduced Numerical Model for Methane Hydrate Formation under Conditions of Variable Salinity. Time-Stepping Variants and Sensitivity*, Computation 2016, Special Issue on Advances in Flow and Transport in Porous Media, 4(1), 1; `https://doi:10.3390/computation4010001`.

8. N. Gibson, P. Medina, M. Peszynska, R. Showalter, *Evolution of phase transitions in methane hydrate*, J. Math. Anal. Appl., Volume 409, Issue 2 (2014), pp 816-833, `doi=10.1016/j.jmaa.2013.07.023.`

9. F.P. Medina and M Peszysnka, *Stability for implicit-explicit schemes for non-equilibrium kinetic systems in weighted spaces with symmetrization*, Journal of Computational and Applied Mathematics, Volume 328 (2018), pp 216-231, `https://doi.org/10.1016/j.cam.2017.07.020`

Theses

1. F. Patricia Medina. *Mathematical Treatment and Simulation of Methane Hydrates and Adsorption Models,* Ph.D. Dissertation, Oregon State University, 2014, Corvallis, Oregon. U.S.A.

2. F. Patricia Medina. *Non-complementarity of Orlicz spaces in* $L^1[0,1]$ *and* $C[0,1]$, Master's Thesis, Universidad de Los Andes , 2003, Mérida, Venezuela.

3. F. Patricia Medina *Regression Analysis using local polynomials,* Licenciado Thesis, Universidad Central de Venezuela, 2000, Caracas, Venezuela.

Presentations

Talks

2021 Classification Frameworks Comparison on 3D Point Clouds F. Patricia Medina (Yeshiva University); co-author: Randy Paffenroth (Worcester Polytechnic Institute), IEEE HPEC 2021.

2021 (Invited lectures) Two invited lectures, REU summer program "STEM for All" , University of Rochester, Rochester, New York.

2019 (Invited Talk) Deep learning in LiDAR and how mathematical ideas can help us in machine learning. Mathematics Graduate Student Seminar. March, California State University Channel Islands, Camarillo, CA.

2019 (Postdoc/Grad seminar) Deep learning in LiDAR and how mathematical ideas can help us in machine learning. ICERM Graduate Student and Postdoc Seminar. March, ICERM, Brown University, Providence, Rhode Island.

2019 (Invited Short Research Talk) Machine learning research in geospatial data. Algebraic Vision Research Cluster, ICERM, Brown University, Providence, Rhode Island.

2019 (Invited Talk) Deep learning in LiDAR and how mathematical ideas can help us in machine learning. Mathematics and Computer Science Colloquium. February, University of Dallas, Irving, Texas.

2019 (Invited Talk) Deep learning in LiDAR and how mathematical ideas can help us in machine learning. Mathematics Department Colloquium. February, California Polytechnic State University, San Luis Obispo, California.

2019 (Research Group Presentation) Deep learning in LiDAR and how mathematical ideas can help us in machine learning. Prof. Randy Paffenroth Data Science Research group. January, Worcester Polytechnic Institute, Worcester, Massachusetts.

2019 (Invited Talk) Deep learning in LiDAR and how measure theory can help us in machine learning. Denksport series. January, Worcester Polytechnic Institute, Worcester, Massachusetts.

2018 (Contributed Talk) Deep Learning for classification of 3D point cloud LiDAR (joint with R. Paffenroth). SIAM Annual Meeting. June 11. Portland, Oregon

2018 (Contributed Talk) Deep learning in 3D point cloud LiDAR data. Advancing Women's in Mathematics, New England (AWIMS). July.Worcester Polytechnic Institute, Worcester, Massachusetts.

2018 (Research Group Presentation) Analysis of Simulated Crowd Flow Exit Data: The Deep Learning Approach. Prof. Randy Paffenroth Data Science Research group. February. Worcester Polytechnic Institute, Worcester, Massachusetts.

2017 (Research Group Presentation)Deep Learning in LiDAR Data. Prof. Randy Paffenroth Data Science Research group. November, Worcester Polytechnic Institute, Worcester, Massachusetts.

2017 (Report progress presentation) for Project 2: Representation of Data as Multi-Scale Features and Measures. Women in Data Science and Mathematics Research Collaboration Workshop (WiSDM). July. Institute for Computational and Experimental Research in Mathematics (ICERM), Providence, Rhode Island.

2017 (Invited Talk) Evolution of phase transitions in methane hydrate. Schlumberger Research Center. June. Cambridge, Massachusetts.

2017 (Applied Math Days) Mathematical treatments and Simulation of a Methane Hydrate Model. April. Rensselaer Polytechnic Institute. Troy, New York.

2017 (Contributed Talk) Numerical Approximations for methane hydrate models. Women's Intellectual Research Symposium, New England. A meeting of Mathematical Minds. Brown University. March. Providence, Road Island.

2016 (Analysis and PDE Seminar) A Consequence of the absence of Dunford-Pettis Property in Orlicz Spaces. Department of Mathematical Sciences. December. Worcester Polytechnic Institute, Worcester, Massachusetts.

2016 (Numerical Analysis Seminar) Numerical Approximation for a Model of Methane Hydrates. Department of Mathematical Sciences.December. Worcester Polytechnic Institute, Worcester, Massachusetts.

2016 (Colloquium Talk) Hybrid Modeling and Analysis of Multicomponent Adsorption with Applications to Coalbed Methane. Department of Mathematical Sciences. November. Worcester Polytechnic Institute, Worcester, Massachusetts.

2016 (Finite Element Circus) Analysis and Numerical Approximations for Kinetic Adsorption Models. October. Worcester Polytechnic Institute, Worcester, Massachusetts.

2016 (Poster Blitz Presentation) Systems of Conservation Laws for Thermodynamically consistent Adsorption. Workshop for Women in Math Sciences. April. SAMSI, Research Triangle Park, North Carolina.

2015 (Contributed Talk) Analysis and Numerical Approximation for Adsorption Models. SIAM Conference on Mathematical and Computational Issues in the Geosciences. June. Stanford University. Stanford, California.

2015 (Applied Mathematics and Computation Seminar) New Stability Framework for Kinetic Systems. November. Oregon State University.

2015 (Invited Talk) Analysis and Numerical Approximation for Adsorption Models. SIAM Conference Computational Science and Engineering. March. Salt Lake City, Utah.

2014 (Applied Mathematics and Computation Seminar) Hyperbolic Systems for Adsorption. Cascade Computational and Applied Mathematics Seminar. April. Corvallis, Oregon.

2013 (Invited Talk) Numerical approximation for a model of Methane hydrates. Pacific Northwest Numerical Analysis Seminar. October. Seattle, Washington (`http://faculty.washington.edu/rjl/pnwnas/2013/Medina_PNWNAS_2013.pdf`).

2013 (Contributed Talk) Numerical approximation for a model of methane hydrates. Department of Mathematics, University of Padova. SIAM Conference on Computational and Mathematical Issues in the Geosciences. June. Padova, Italy.

2013 (Applied Mathematics and Computation Seminar talk) Numerical Approximation for a model of methane hydrates. June. Oregon State University. Corvallis, OR

2012 (Applied Mathematics and Computation Seminar) *Hyperbolic systems for adsorption* (joint with M. Peszynska). May. Oregon State University.

2010 (Probability Seminar) *The Dunford-Pettis theorem, Orlicz spaces and related topics.* April. Oregon State University. Corvallis, OR.

2010 (Probability Seminar) *On the convergence in mean of martingale difference sequence.* April. Oregon State University.

2008 (Analysis Seminar) *Uniform integrability and the De La Valle Poussin and Dunford-Pettis theorems.* March. Bowling Green State University. March. Bowling Green, OH.

2004 (Contributed talk) XVII Jornadas Venezolanas de Matemáticas. *Non-complementarity of Orlicz spaces in* $L^1[0,1]$ *and* $C[0,1]$. March. Trujillo, Venezuela.

2003 (Functional Analysis Seminar) *Orlicz Spaces.* Universidad de Los Andes. Mérida, Venezuela.

2003 (Functional Analysis Seminar) *Topology in* $C[0,1]$. Universidad de los Andes, Mérida, Venezuela.

Posters

2017 Mathematical treatment and simulation for a methane hydrate model. Modern Advances in Computational and Applied Mathematics: A workshop in honor of the birthdays of Charles L. Epstein and Leslie Greengard. Yale University. June. New Haven, Connecticut.

2017 Mathematical Treatment and simulation for methane hydrate models. High Performance Computing Days 2017. University of Massachusetts Dartmouth. Center of Scientific Computation and Visualization Research. May. North Dartmouth, Massachusetts.

2017 Mathematical treatment and simulation for methane hydrate models. Frontiers in Applied and Computational Mathematics. The Division of Applied Mathematics at Brown University. January. Providence, Road Island.

2016 Hybrid Modeling and Analysis of Multicomponent Adsorption with Applications to Coalbed Methane. The 2016 Blackwell-Tapia Conference and Award Ceremony. University of Tennessee. October. Knoxville, Tennessee.

2016 Systems of Conservation Laws for Thermodynamically consistent Adsorption. Workshop for Women in Math Sciences. April. SAMSI, Research Triangle Park, North Carolina.

2013 Systems of conservation laws for thermodynamically consistent adsorption with subscale diffusion and memory terms. Department of Mathematics, University of Padova, Italy. SIAM Conference on Computational and Mathematical issues in the Geosciences. June. Padova, Italy.

2012 Systems of conservation laws for thermodynamically consistent Adsorption with sub-scale diffusion (joint with M. Peszynska). SIAM Annual Meeting. July. Minneapolis, Minnesota.

Grants and Awards

1. **Grants**

2020–2021 PIs. F. Patricia Medina and Juan Li. Google Explore grant.

2018–2020 P.I., AI for Earth Microsoft Azure Compute Grant ($10,000). Project: "Solutions for climate change science: using deep learning to improve vegetation classification". Co-PIs: Jonathan Batchelor, L. Monika Moskal, Randy Paffenroth, Guang Zhen.

2017 P. A., Women Impact Network grant (WIN) with Lucia Carichino and Xiaodan Zhou to fund the event "Advancing Women's Impact in Mathematics Symposium, New England (AWIMS)", April 2018 ($5,000)

2011 Co-P.I., AWM for SK Days through NSF Grant NSF-DMS-1028861 to fund "Sonia Kovalevsky Days for Middle School Children" with Nathan Gibson, Holly Swisher, Vrushali Bokil and AWM student chapter Officers, Association for Women in Mathematics (AWM), May 2011 ($1,000)

2. **Participation in funded research**

2012–2014 Graduate Research Assistant, NSF-DMS 1115827 "Hybrid modeling in porous media", PI: Professor M. Peszynska.

Summer 2015 Research Instructor, NSF-DMS 1115827 "Hybrid modeling in porous media", PI: Professor M. Peszynska

3. **Travel grants, scholarships and distinctions**

2018 AWM Travel grant for invited talk at AWM Research Symposium, Rice University, Houston on April 2019.

2018 Microsoft Family Fellowship to support participation in the Computer Vision Long 2019 Spring Semester Program, ICERM, Brown University.

2017 ICERM travel support to participate in WiDS workshop research collaborations at ICERM.

2017 Partial support from AWM ADVANCE grant for travel expenses to participate in WiDS workshop at ICERM 2017.

2016 NIMBios Travel award. The 2016 Blackwell-Tapia Conference and Award Ceremony. NIMBios, University of Tennessee, Knoxville, Tennessee.

2016 SAMSI Travel award. Poster presentation. SAMSI. Research Triangle Park, North Carolina.

2015 Early career travel SIAM Travel award. Contributed talk. Stanford University. Stanford, California USA.

2015 Early career IMA Travel Award to attend *New Directions Short Course on "Introduction to Uncertainty Quantification"*. Institute for Mathematics and its Applications (IMA), Minneapolis, Minnesota.

2015 Early careers SIAM Travel award to give an invited talk at SIAM Conference on Computational Science and Engineering. Convention Center. Salt Lake City, Utah.

2014 Student speaker at the Pacific Northwest Numerical Analysis Seminar. Selected among students in all Pacific Northwest universities to give a talk in the PNWNAS 2014. Nominated by the the department of Mathematics at Oregon State University.

2013 SIAM International student travel award for to present at SIAM Conference on Computational and Mathematical issues in the Geosciences. Padova, Italy.

2012 SIAM Student travel award for SIAM student chapter representative. SIAM Annual Meeting. Minneapolis, Minnesota.

2011 OSU. Nominated by the department of mathematics for attending MSRI summer workshop 2011.

2011 MSRI Student travel award for MSRI summer graduate workshop. Berkeley, California.

2006 – 2008 Universidad Simón Bolívar Partial funding for professors in leave for PhD studies

2001 Venezuelan Institute for Scientific Research. Travel Award to attend "Escuela Venezolana de Matemáticas"

2001 – 2003 FONACIT/ CONICIT (Ministry of Science and Technology). Scholarship for graduate studies (Master in Science)

2001 Venezuelan Institute for Scientific Research. Scholarship for first two terms of graduate studies.

Professional Activities

2021 Co-organizer, lecturer and project leader, TRIPODS NSF REU-STEM FOR ALL 2021 NEURAL NETWORKS, JULY 19-AUGUST 13

2021 Lecturer and project leader, MAA - SIAM & TRIPODS Advanced Workshop in Data Science for Mathematical Sciences Faculty, Jun 28 - Jul 2, 2021

2021 Journal Referee. Research in Data Science, Association of Women in Mathematics Series, Springer

Professional Development

2018 Geohack Week. eSience Institute. University of Washington. September 11-14 Seattle. WA.

2017 Women in Data Science and Mathematics Research Collaboration Workshop (WiDSM). Institute for Computational and Experimental Research in Mathematics (ICERM). July. Providence, Rhode Island.

2016 Workshop for Women in Math Sciences. Statistical and Applied Mathematical Sciences Institute (SAMSI). April. Research Triangle Park, North Carolina.

2015 New Directions Short Course on "Introduction to Uncertainty Quantification". Institute for Mathematics and its Applications (IMA). June. Minneapolis, Minnesota.

2015 Oregon State University. Ecampus Faculty Forum, April. Corvallis, OR.

2014 IMA Special Workshop: Careers and Opportunities in Industry for Mathematical Scientists. April. Minneapolis, MN.

2011 Summer Graduate Workshop. Berkeley, CA. The Dirichlet Space: Connections between Operator Theory, Function Theory, and Complex Analysis, Mathematical Sciences Research Institute. June. Berkeley, CA,

2005 Infinite Dimensional Analysis Conference. Kent, OH. Kent State University. February. Kent, OH

2005–2006 Universidad Simón Bolívar Mathematics graduate courses (Harmonic Analysis I and II), Caracas, Venezuela

2004 XVII Escuela Venezolana de Matemáticas y IV EMALCA. Mérida, Venezuela Escuela de Matemáticas de América latina y el Caribe. *Tensor products of Banach spaces* by Joe Diestel and Johan Swart. Kent State University. September. Kent, OH.

2002 XV Escuela Venezolana de Matemáticas y IV EMALCA. Mérida, Venezuela Escuela de Matemáticas de América latina y el Caribe I. *Semigroups of operators and some applications* by Diomedes Bárcenas and Hugo Leiva (Universida de los Andes) II. *Ultraproducts in Analysis* by Jose Iovino (University of Texas, San Antonio). September. Mérida, Venezuela.

2001 XIV Escuela Venezolana de Matemáticas. Mérida, Venezuela. *Gaussian Processes extremes* by Mario Wschebor (Universidad de la República, Uruguay). September. Mérida, Venezuela.

Service

2018 Organizational Committee. "Advancing Women's Impact in Mathematics Symposium, New England (AWIMS)". April. Worcester, MA.

2017 Contributed talk session chair. Women's Intellectual Research Symposium, New England. A meeting of Mathematical Minds. Brown University. March. Providence, Road Island.

2017 Poster judge Graduate Research Innovation Exchange (GRIE). Open Poster Exhibition and Celebration. Worcester Polytechnic Institute. February. Worcester, Massachusetts.

2014 Organizational committee. SIAM and AWM Student Chapter speaker series. Speaker: Dr. Talitha Washington (Professor at Howard University). Oregon State University. April. Corvallis, OR.

2014 Cascade Computational and Applied Mathematics Seminar Student organizing committee. April. Corvallis, OR.

2010–2011 OSU SIAM Student Chapter. President, 2013–2014. Vice-President, 2012 – 2013, Treasurer

2013 – 2014 OSU AWM Student Chapter. President, 2010–2011. Vice-President 2011–2012.Treasurer

2013 Organizational committee. SIAM Student Chapter speaker series. Speaker: Dr. Thomas Grandine (Senior researcher at Boeing and SIAM Vice-president for industry),Oregon State University

2013 Member of panel. Question, answer session for graduate student in Mathematics. MTH 599 ,Oregon State University. March. Corvallis, OR.

2011 Chair of organizational Committee. Sonia Kovalevskaya Days, Oregon State University. November. Corvallis, OR.

2011 Chair of student committee for faculty promotion and tenure. Department of Mathematics. Oregon State University

2010 Chair of student committee for faculty promotion and tenure. Department of Mathematics. Oregon State University

Computer Skills

Scripting/Programming. MATLAB, HTML, PYTHON (pandas, sklearn)

Mathematics Software. MAPLE, TensorFlow

Productivity Software. LaTeX, EXCEL, etc.

Operating Systems. WINDOWS, UNIX, MAC (basic)

Languages

English (fluent)

Spanish (native)

Professional associations

AWM (Association of Women in Mathematics)

AMS (American Mathematical Society)

SIAM (Society of Industrial and Applied Mathematics). Activity group: Geoscience.