

Matilde Sanchez-Pena, Ph.D.

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Education

Ph.D. in Engineering Education Purdue University – West Lafayette, IN Dissertation: <i>A quantitative study of faculty retention and promotion in engineering across gender</i>	Aug 2018
Graduate Certificate in Teaching and Learning in Engineering Purdue University – West Lafayette, IN	Aug 2018
M.S. in Statistics The Ohio State University – Columbus, OH	May 2014
M.S. in Industrial Engineering University of Puerto Rico at Mayaguez (UPRM) – Mayaguez, PR Thesis: <i>Identification of potential cancer biomarkers through multiple criteria optimization using microarray data.</i>	Dec 2011
B.E. in Manufacturing Engineering Autonomous University of Nuevo León (UANL) – San Nicolás de los Garza, NL. México Thesis: <i>Data Envelopment Analysis: Grouping, Sensitivity Analysis and Prediction Studies</i>	Aug 2007

Honors and Awards

2018	Estus H. and Vashti L. Magoon Award for Excellence in Teaching Award, College of Engineering, Purdue University.
2015	Graduate Mentor of the Summer – Summer Undergraduate Research Fellowship (SURF) Purdue University.
2015	Travel Grant for the Diversity in Statistics Mentoring program during the Joint Statistical Meetings 2015, American Statistical Association.
2015	Purdue Women in Engineering Program travel grant for Technical Conference.
2011	CONACYT (Mexican Council of Science and Technology) Scholarship for Graduate Studies at The Ohio State University (2011-2013). <i>Competitive merit-based national scholarship for graduate education abroad</i>
2010	Travel and Participation Award for SACNAS National Conference 2010, Anaheim, CA.
2010	Participation Award for UPR – MDACC Bioinformatics and Genetic Epidemiology seminar, San Juan, PR.
2009	Third Place, Graduate Research Posters Category, 7 th Industrial Engineering Research and Design Exhibition, UPRM, Mayaguez, PR.
2008	Research Award in Exact Sciences 2008, UANL, San Nicolás de los Garza, NL, México, (Coauthor with, Dr. Mauricio Cabrera-Ríos and Maria Guadalupe Villarreal M.) <i>Highest recognition for research at the Autonomous University of Nuevo Leon</i>

Research

- Visiting Assistant Professor** Aug 2018 -
School of Engineering Education
Purdue University
- Graduate Research Assistant** Aug 2014 – Jul 2017
Social Policy in Higher Education Research in Engineering (SPHERE)
School of Engineering Education – Purdue University
Conducted statistical analysis and scholarly writing in different projects
- Graduate Research Associate** Oct 2013 – May 2014
Community Research Partners – Columbus, OH
Assisted the evaluation of social programs through statistical analyses
- Visiting Scientist** Jun – Aug 2011
Division of Bioinformatics – University of Alabama at Birmingham
Provided training on statistical tools and programming to health scientists
- Post-Master Researcher** Jan – May 2011
BioIE Lab – Applied Optimization Group
Industrial Engineering Department - UPRM
Mentored undergraduate students in research activities, scientific writing
- Visiting Scholar** May – Aug 2010
Dept of Bioinformatics and Computational Biology
University of Texas – MD Anderson Cancer Center
Created web-based technologies for the analysis of Reverse Phase Protein Arrays (RPPAs)
- Graduate Research Assistant** Aug 2008 – Dec 2010
BioIE Lab - Applied Optimization Group
Industrial Engineering Department – UPRM
Developed tools for the identification of potential cancer biomarker genes, scientific writing
- Quality Assurance Assistant** Feb – Jul 2005
KEMET de Mexico – Guadalupe, NL, Mexico
Implemented and evaluated strategies for the reduction of defective PPMs in the production line

Research Grants

Title: Impact of stigma around mental illness among engineering undergraduates and professionals.

Target Founding Agency: National Science Foundation – EEC – Broadening Participation in Engineering

Co-authors: Matilde Sanchez-Pena (Purdue University, PI), Nichole Ramirez (Purdue University, Co-PI), Xinrui Xu (Purdue University – Co-PI)

Amount: \$350,000

Status: Under Preparation

Title: Characterizing Engineering Students' Computational Efficiency, Innovation, and Confidence throughout their Two-Year Community College Experience

Founding Agency: National Science Foundation – Research in the Formation of Engineers

Co-authors: Alejandra Magana (Purdue University, PI), David Ely (Ivy Tech Community College, Co-PI), Aasakiran Madamanchi (Purdue University, Co-PI), Matilde Sanchez-Pena (Purdue University, Co-PI).

Amount: \$350,000

Status: Unfunded

Publications

Refereed Journal Papers

- J1. Secules, S., McCall, C., Mejia, A., Svyantek, M., Beebe, Ch., Masters, A. **Sanchez-Pena, M.** (2019). Complicating Transparency: A Discussion of Positionality Practices and Dimensions of Impact on Research on Education and Equity (Upcoming 2020 - Accepted with minor revisions).
- J2. Ortega-Alvarez, J.D., Vieira, C., **Sanchez-Pena, M.**, Streveler, R.A. (2018). The challenges of assessing transformative learning: Lessons learned from an instructional design workshop for Colombian engineering faculty. *International Journal of Engineering Education*. 34(5).
- J3. Rivera EM, Irizarry ZI, **Sánchez-Peña ML**, Cabrera-Ríos, M, Isaza CE. (2017). Baseline detection of potential cancer biomarkers with linear models from microarray experiments. *Cancer Studies*, 1(1):4.
- J4. **Sánchez-Peña, M.**, Isaza, C.E., Pérez-Morales, J., Rodríguez-Padilla, C., Castro, J.M., Cabrera-Ríos, M. (2013). Identification of potential biomarkers from microarray experiments using multiple criteria optimization. *Cancer Medicine*, 2(2), 253-265. doi:10.1002/cam4.69
- J5. Watts, E., **Sánchez-Peña, M.L.**, Isaza, C.E., Cabrera-Ríos, M. (2012). Potential colon cancer biomarker search using more than two performance measures in a multiple criteria optimization approach. *Puerto Rico Health Sciences Journal*, 31(2), 59-63.
- J6. Cedeño-Mattei, Y., **Sánchez-Peña, M.**, Lara-Rodríguez, Y., Perales-Pérez, O., Cabrera-Ríos, M. (2012). A case study on statistical characterization and optimization of coercivity

in cobalt ferrite nanoparticles. *Proc. IMechE Part B: J. Engineering Manufacture*, 226(1), 178-182.

- J7. Rodríguez, J.A., Rivero, J., **Sánchez-Peña, M.**, Isaza, C.E., Cabrera-Ríos, M. (2010). Two novel nonparametric methods for cancer diagnosis through microarray experiments. *Puerto Rico Health Sciences Journal, Special Issue: Cancer*, 29(3), 305-311.
- J8. Villarreal Marroquín, M.G., **Sánchez-Peña, M.**, Castro, C.E., Castro, J.M., Cabrera Ríos, M. (2008). Using data clustering to aid the solution of multiple criteria optimization problems through data envelopment analysis. *Intelligent Data Analysis*, 12(1), 89-101.
- J9. **Sánchez Peña, M.L.**, Villarreal Marroquín, M.G., Cabrera-Ríos, M. (2008). Uso del análisis envolvente de datos y técnicas de agrupamiento en optimización multicriterio. *Ciencia-UANL*, 11(4), 377-383.
- J10. **Sánchez Peña, M.L.**, Villarreal Marroquín, M.G., Cabrera-Ríos, M. (2008). Optimización multicriterio a través de análisis envolvente de datos: Caso práctico en manufactura por inyección de plásticos. *Ingenierías*, 11(39), 59-65.
- J11. **Sánchez Peña, M.L.**, Villarreal Marroquín, M.G., Cabrera-Ríos, M. (2008). Optimización multicriterio a través de análisis envolvente de datos: Estrategias de agrupamiento y de discriminación. *Ingenierías*, 11(38), 52-59.

Manuscripts in preparation

- IP1. **Sanchez-Pena, M.**, Main, J.B., Cox, M.F. (2019). The advancement of women faculty in engineering: A quantitative study of faculty retention and promotion in engineering across gender.
- IP2. **Sanchez-Pena, M.**, Ramirez, N., Xu, X., Sambamurthy, N. (2019). Experiences of engineering students and professionals living with mental illness.
- IP3. Garces, S., Magana, A., **Sanchez-Pena, M.** (2019). Teamwork Characteristics and Team Performance of Agile Self-Managing Teams During Problem-Based Learning.
- IP4. **Sanchez-Pena, M.**, Lin, A. (2019). Perceptions engineering education graduate students in about learning statistics.

Refereed Conference Papers (presenter is underlined)

- C1. **Sanchez-Pena, M.**, Ramirez, N., Xu, X., Sambamurthy, N. (2019). Engineering students and professionals with diagnosed mental illness: an exploration of their experiences and challenges. *2019 Frontiers in Engineering Education Conference*, Cincinnati, OH.
- C2. Kim, E., Hicks, N., **Sanchez-Pena, M. L.** (2019). Assessing the data analysis training of engineering undergraduates. *ASEE 126nd Annual Conference & Exposition*. Tampa, FL.
- C3. Ehsan, H., **Sanchez-Pena, M. L.**, Ebrahiminejad, H., Al Yagoub, H.A. (2019). Capturing the experiences of ESL graduate students in engineering education. *ASEE 126nd Annual Conference & Exposition*. Tampa, FL.
- C4. Kim, J., Cox, M.F., **Sanchez-Peña, M.L.**, Main, J.B., McGee, E. (2017). Development of a national survey focusing on the relationships between race, class, and gender on the persistence of women engineering faculty. *ASEE 124nd Annual Conference & Exposition*. Columbus, OH.

- C5. Ortega, J. D., Vieira, C., **Sanchez-Pena, M. L.**, Streveler, R. (2017). Assessing Transformative learning about instructional design: An example with Colombian engineering faculty. *7th Research in Education Symposium*. Bogotá, Colombia.
- C6. Sambamurthy, N., **Sánchez-Peña, M.**, McGee, E., Cox, M.F., Main, J.B. (2016). Asian-American women engineering faculty: A literature review using an intersectional framework of race, class, and gender. *2016 Frontiers in Engineering Education Conference*. Eerie, PA.
- C7. **Sánchez-Peña, M.**, Sambamurthy, N., McGee, E., Cox, M.F., Main, J.B. (2016). The factors affecting the persistence of Latina faculty: A literature review using the intersectionality of race, class, and gender. *2016 Frontiers in Engineering Education Conference*. Eerie, PA.
- C8. Denney, L.B., **Sánchez-Peña, M.**, Main, J.B. (2015). Examining how international experiences promote global competency among engineering graduate students. *2015 Frontiers in Engineering Education conference*. El Paso, TX.
- C9. Rodriguez-Simmonds, H.E., **Sánchez-Peña, M.**, Atiq, Z., Coutinho, G., Jesiek, B. (2015). A letter to the future engineer: Exploring cross-cultural engineering identities through practitioners' letters of advice. *2015 Frontiers in Engineering Education conference*. El Paso, TX.
- C10. Main, J.B., **Sanchez-Pena, M.** (2015). Student evaluation of team members: Is there gender bias? *2015 Frontiers in Engineering Education conference*. El Paso, TX.
- C11. Main, J.B., **Sánchez-Peña, M.** (2015). Intercultural competency among doctoral students. *6th Research in Engineering Education Symposium*, Dublin, Ireland.
- C12. Main, J.B., **Sánchez-Peña, M.** (2015). Measuring engineering students' ability to thrive in diverse and global environments. *ASEE 122nd Annual Conference & Exposition*. Seattle, WA.
- C13. Rivera, E.M., Irizarry, Z., **Sánchez-Peña, M.L.**, Isaza, C.E., Seguel, J., Cabrera-Ríos, M. (2011). Consistent detection of cancer Biomarkers with linear models. *IEEE International Conference on Bioinformatics and Biomedicine Workshops (BIBMW)*. Atlanta, GA.
- C14. **Sánchez-Peña, M.**, Isaza, C.E., Cabrera-Ríos, M. (2010). Identification of potential cancer biomarkers using multiple criteria optimization. *Proceedings of the 5th INFORMS Workshop on Data Mining and Health Informatics*. Austin, TX.
- C15. **Sánchez-Peña, M.**, Villarreal-Marroquin, M.G., Castro, J.M., Cabrera-Ríos, M. (2009). Setting processing conditions under multiple criteria. *Industrial Engineering Research Conference*. Miami, FL.
- C16. Cedeño-Mattei, Y. **Sánchez-Peña, M.**, Perales-Perez, O., Cabrera-Ríos, M. (2009). Experimental optimization of nanomagnetic properties. *Industrial Engineering Research Conference*. Miami, FL.
- C17. **Sánchez Peña, M.**, Villarreal Marroquín, M.G., Cabrera-Ríos, M. (2007). Agrupamiento de datos para la solución del problema de optimización multicriterio por medio de análisis envolvente de datos: Segunda Parte. *5th IEEE International Congress in Technological Innovation and Development*. Cuernavaca, Morelos, México.

Conference Poster Presentations

- P1. Diaz-Candelas, P., **Sánchez-Peña, M.**, Isaza, C.E., Cabrera-Ríos, M. (2011). Comparison of data envelopment analysis models to identify potential cancer biomarker genes for colon

cancer. *Proceedings of the Association of Biomolecular Resource Facilities (ABRF) Conference 2011, San Antonio, TX.* (Alternate citation: *J Biomol Tech.* 22(Supplement): S38).

- P2. Isaza, C.E., Sánchez-Peña, M., Rodriguez, C., Cabrera-Ríos, M. (2010). An optimization-based approach to potential biomarker identification with microarray data. *Proceedings of the 9th AACR Annual Frontiers in Cancer Prevention Research Conference.* Philadelphia, PA. (Alternate citation: *Cancer Prevention Research*, 3(12 Suppl):B45).
- P3. Rodriguez, J.A., Sánchez-Peña, M., Isaza, C.E., Cabrera-Ríos, M., Rivero, L. (2010). Two novel distribution-free methods for cancer diagnosis through microarray analysis. *Proceedings of the IIE Annual Conference.* Cancún, México.

Refereed Conference Oral Presentations (presenter is underlined)

- OP1. Sánchez-Peña, M., Main, J.B. (2015). Children statistical literacy: Empowering and informing our future decision makers. *Joint Statistical Meetings of the American Statistical Association.* Seattle, WA.
- OP2. Sánchez-Peña, M., Main, J.B. (2015). Exploring the international experiences of U.S. domestic engineering graduate students. *Illinois-Indiana ASEE Section Conference.* Fort Wayne, IN.
- OP3. Sánchez-Peña, M. (2013). How different are the reasons that makes us ill? *MALCS (Mujeres Activas en Letras y Cambio Social) Summer Institute.* Columbus, OH.
- OP4. Sánchez-Peña, M., Castro, J.M., Isaza, C.E., Cabrera-Ríos, M. (2010). Cancer biomarker search through multiple criteria optimization using microarray data. *SACNAS (Society for the Advancement of Chicanos and Native American in Science) Annual Meeting.* Anaheim CA.
- OP5. Sánchez-Peña, M., Ramirez, N., Isaza, C.E., Cabrera-Ríos, M. (2010). Cancer tissue classification through logistic regression. *Proceedings of the IIE Annual Conference.* Cancún, México.
- OP6. Sánchez-Peña, M., Isaza, C.E., Castro, J.M., Cabrera-Ríos, M. (2010). Biological discovery through microarray analysis using multiple criteria optimization. *Proceedings of the IIE Annual Conference.* Cancún, México.
- OP7. Garcia, J., Sánchez Peña, M., Isaza, C.E., Cabrera-Ríos, M. (2010). Comparative study on data envelopment analysis models for gene identification. *Proceedings of the IIE Annual Conference.* Cancún, México.
- OP8. Mendez, B., Watts, E., Sánchez-Peña, M., Isaza, C.E., Cabrera-Ríos, M. (2010). Finding potential cancer biomarkers using a single microarray experiment with replicates. *Proceedings of the IIE Annual Conference.* Cancún, México.

Books

Cabrera-Ríos, M., **Sánchez, M.L.,** Isaza, C.E. (2011). *Identification of potential cancer biomarkers from microarray data: A parameter-free novel tool for meta-analysis of microarray databases,* VDM Verlag DR Müller, ISBN-13: 978-3-639-36348-7.

Teaching

In Engineering Education

Undergraduate Courses

IDE 360: Multidisciplinary Engineering Statistics, Instructor

Purdue University – Fall 2019 (17 students) & Spring 2020 (13 students)

Relevant innovations:

- Restructuring of the content and delivery of the course following a research-based course design.
- Inclusion of Data Science requirements.
- Develop materials to transform the course to a flipped learning format.

ENGR 132: Transforming Ideas to Innovation II, Curators team

Preparing materials for a new class project to be piloted in Fall 2019 and deployed across all sections in Spring 2020.

ENGR 132: Transforming Ideas to Innovation II, Instructor

Purdue University

Spring 2019 (2 sections, 117 (Evaluation 3.7/5) and 113 students (Evaluation 3.7/5) respectively)

Spring 2020 (1 section, 80 students – No evaluation applicable, Adjusted to COVID-19)

Relevant innovations:

- Contributing to build new assessment materials

ENGR 131: Transforming Ideas to Innovation I, Instructor

Purdue University - Fall 2018 (1 section, 111 students)

Student Evaluation: 4/5

Relevant innovations:

- Co-design and implement a new design project, oriented to create solutions to increase the quality of life of people with aphasia.
- Pilot strategies to infuse a culture of mental health among first-year engineering students.
- Implemented informational elements for increasing awareness of the value of diversity in engineering.

ENGR 131/132: Transforming Ideas to Innovation I and II, Graduate Teaching Assistant

Purdue University - Fall 2017 & Spring 2018 (2 sections/semester, ~120 students per section)

Supervisors: Dr. Michele Strutz (Fall 2017), Jim Whitford & Dr. William Oakes (Spring 2018)

Relevant activities:

- Prepared and delivered content of several sessions on programming and teamwork.
- Trained, managed, and mentored Peer Teachers and Graders throughout the semester.
- Assessed the quality of grading and feedback provided to students.
- Created exam problems and other materials related to the course.
- Contributed actively to monitoring student performance and well-being.

IDE 360: Multidisciplinary Engineering Statistics, Graduate Teaching Assistant

Purdue University – Spring 2017 (25 students)

Supervisor: Dr. Joyce Main

Relevant Activities:

- Prepared and delivered content related to different statistical topics.
- Created exam materials and other assessment tools.

ININ 4027 – Design and Analysis of Experiments, Graduate Teaching Assistant

Industrial Engineering Dept., UPRM – Spring 2009 (25 students) & Spring 2010 (23 students)

Supervisor: Dr. Mauricio Cabrera-Rios

Relevant activities:

- Evaluated students' final project of designing paper planes.
- Designed and executed the paper plane competition accompanying the project.

Graduate Courses

ENE 506: Content, Assessment, and Pedagogy, Faculty Apprentice

Purdue University – Spring 2018 (15 students)

Faculty mentor: Dr. Ruth A. Streveler

Relevant activities:

- Prepared and delivered content related to students' intellectual development and the application of the CAP model for course design.
- Provided feedback to students on their individual projects.
- Contributed to the continuous improvement of the course.

Faculty Development

ITE – Instructional Tools in Engineering, Co-Creator & Co-Instructor

Universidad Nacional de Colombia, Bogotá, Colombia – July 2017 (18 participants)

Universidad EAFIT, Medellin, Colombia – July 2017 (28 participants)

Universidad del Magdalena, Santa Marta, Colombia – July 2017 (14 participants)

Description: One-week workshop for engineering faculty at Latin American universities about the use of evidence-based tools to design, implement, and deliver engineering courses.

Collaborators: Juan Ortega-Alvarez, Dr. Camilo Vieira

Relevant activities:

- Designed the course content, assessment, and pedagogy using evidence-based strategies.
- Refine and delivered sessions about: (1) engineering education research, (2) nature and implementation, and challenges of the flipped classroom, and (3) the need to understand the students' characteristics while designing a course.
- Created course related materials and assessments.

Others

Is that true? Evaluating everyday information through data, Course Creator & Instructor

Purdue University Gifted Education Research Institute (GERI)

Summer 2015 (8 students)

Statistics unchained: Discovering the power of statistics, Course Creator & Instructor

Purdue University Gifted Education Research Institute (GERI)

Summer 2015 (29 students) & Summer 2016 (15 students)

Pre-Calculus & Calculus I, Undergraduate Teaching Assistant

School of Economics – UANL, Fall 2007 (46 students)

Math Olympiads for elementary, middle, and high school students, Trainer

Office of High Schools Programs – UANL, Summer 2002-2005 (groups of 6 to 30 students)

Student Supervision and Mentoring

Student Name: Fantasi Curry
Degree: Ph.D. in Engineering Education
Role: Explorer Project Supervisor (Fall 2019)
Project: Exploring the current needs of data analysis skills of practicing engineers through a Delphi Study

Student Name: Athena Lin
Degree: Ph.D. in Engineering Education
Role: Explorer Project Supervisor (Fall 2019)
Project: Experiences of engineering graduate students learning statistics

Student Name: Sebastian Garcés Palacio
Degree: M.Sc. in Computer and Information Technology
Graduation Date: Aug 2019
Role: Committee member
Main Advisor: Alejandra Magana
Thesis: Team regulatory strategies and their impact in a software development course using SCRUM

Student Name: Eunhye Kim
Degree: Ph.D. in Engineering Education
Role: Explorer Project Supervisor
Project: Data Analysis Training of Engineering Undergraduates

Student Name: Lauren B. Denney
Degree: B.S. in Multidisciplinary Engineering

Role: Summer Undergraduate Research Fellowship (SURF) Program,
Graduate Mentor
Main Advisor: Dr. Joyce Main
Project: Qualitative study of the experiences of international students
developing global competence.

Other undergraduate mentees:

At Purdue University	Hilal Kesim (Summer 2017) Aaron Afrait (SURF 2017) Christing Chern (SURF 2017)
At University of Puerto Rico at Mayaguez	Erika Watts Oquendo José Rivera Luis Rivero Jorlys Alvarado Jaileene Pérez Morales Paloma Diaz Candelas Bianca Méndez

Invited Seminars

- Fentiman, A. & Sánchez-Peña, M., Preparing for conferences, Professional development workshop for the ASEE Purdue Student Chapter. Purdue University, West Lafayette, February 2017.
- Fentiman, A. & Sánchez-Peña, M., Preparing for conferences, Professional development workshop for the ASEE Purdue Student Chapter. Purdue University, West Lafayette, October 2016.
- Sánchez-Peña, M., Isaza, C.E., Castro, J.M., Cabrera-Ríos, M. Identification of Potential Cancer Biomarkers through Multiple Criteria Optimization using Microarray Data, Industrial Engineering Department – UPRM, April 2010.
- Sánchez-Peña, M., Isaza, C.E., Castro, J.M., Cabrera-Ríos, M., Data Envelopment Microarray Analysis, Industrial Engineering Department – UPRM, April 2009.
- Sánchez-Peña, M., Optimización Multicriterio con Análisis Envolvente de datos utilizando Estrategias de Agrupamiento y de Discriminación, Seminar Series, Graduate Program of Systems Engineering – UANL, August 2007.

Service

- *Reviewer Journal of Engineering Education*
- *Reviewer IEE Transactions in Education*
- *Reviewer Studies in Higher Education*
- *Reviewer Computers in Human Behavior*
- *Reviewer Computer Applications in Engineering Education*
- *Reviewer for the European Journal of Engineering Education – REES 2017 special issue, February 2018*

- *Graduate Representative in the Search Committee of the Kamyar Haghghi Head of the School of Engineering Education, Purdue University, Fall 2016 – Spring 2017.*
- *Treasurer American Society of Engineering Education (ASEE) Purdue Student Chapter 2016-2017*
- *Treasurer Engineering Education Graduate Student Association (ENEGSA) 2016 – 2017*
- *Founding president of BOHIQUE, the UPRM chapter of Latinos in Science and Engineering (MAES).*

Memberships

- *American Society of Engineering Education (ASEE), member since 2014*
- *American Statistical Association (ASA), member since 2013*
- *MALCS (Mujeres Activas en Letras y Cambio Social), member since 2013*
- *Latinos in Science and Engineering (MAES), member since 2010*
- *The Society of the Advancement of Chicanos and Native Americans in Science (SACNAS), member since 2010*

Last update October 18th, 2019