

# Jeremy M. Gernand

jeremygernand.com

(409) 356-3719, jmgernand@psu.edu

58 Pollock Rd., Penn State University, University Park, PA 16802

## EDUCATION

- PhD    Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA, 2013  
M.S.    Mechanical Engineering, Rice University, Houston, TX, 2007  
B.S.    Mechanical Engineering, Texas A&M University, College Station, TX, 1998

## CERTIFICATIONS

- Certified Safety Professional (CSP), #30580, Issued November 2015  
Certified Reliability Engineer (CRE), #8637, Issued March 2015

## PROFESSIONAL EXPERIENCE

- 2020 – Present**      **Associate Professor of Environmental Health and Safety (EHS) Engineering,**  
Department of Energy and Mineral Engineering, Penn State University, University Park, PA

Evaluated policy to reduce air quality impacts of natural gas exploration and waste disposal. Experimentally tested nudges to improve engineering students' decision-making on investments in risk mitigation. Evaluated results of regulator audits for compliance and assessed the predictive value of audit findings for future incidents.

- 2024 – Present**      **Chair, Environmental Systems Engineering Program,** Department of Energy and Mineral Engineering, Penn State University, University Park, PA

Oversee student achievement and curricular development for the undergraduate program in Environmental Systems Engineering, including ensuring compliance with ABET accreditation requirements and university policy.

- 2022 – 2024**      **Associate Department Head for Graduate Education,** Department of Energy and Mineral Engineering, Penn State University, University Park, PA

Design and implement interactive training programs for the next generation of researchers and industry professionals in the fields of energy, critical minerals, safety, and risk analysis. Increased pass rate on PhD qualification exam from 40% to 85%.

- 2013 – 2020**      **Assistant Professor of Environmental Health and Safety (EHS) Engineering,**  
Department of Energy and Mineral Engineering, Penn State University, University Park, PA

Produced research into the development of improved quantitative risk assessment tools and their application in domains of emerging technologies. Led undergraduate and graduate courses related to Safety Engineering and Engineering Risk Analysis. Advised the research of 3 PhD students and 6 MS students.

- 2009 – 2013**      **Research Assistant,** Center for the Environmental Implications of Nanotechnology,  
Carnegie Mellon University, Pittsburgh PA

Developed mathematical models utilizing machine learning techniques to predict the *in vivo* toxicity risk potential of inhaled nanoparticles based on chemical and physical characteristics while relying on an uncertain and incomplete data set.

- 2012**      **Summer Research Associate,** RAND Corporation, Pittsburgh, PA

Developed statistical algorithms to identify reliability problems with different US Army vehicles and part suppliers without knowledge of the underlying usage rate for each vehicle and using only data from warehouse orders to differentiate between quality issues and high use rates.

- 2008 – 2009**      **Program Administrator,** Johns Hopkins University, The JiVitA Project, Rangpur,  
Bangladesh

Facilitated program management and communications between host country professional team and investigative faculty in US for a large public health research study.

**2006 – 2008**      **Senior Reliability Engineer**, Northrop Grumman, Electronic Systems Division, Baltimore, MD

Directed analysis effort for an automated postal sorting system and radar system components including reliability/availability prediction, failure modes and effects analysis (FMEA), and a reliability centered maintenance (RCM) plan using a customized analysis tool that combined multiple data sources to identify potential system design problems. Conducted failure investigations.

**2000 – 2006**      **Safety and Reliability Engineer**, Science Applications International Corporation (SAIC), Houston, TX

Led a team of engineers analyzing the safety hazards and failure risks of new hardware for NASA's International Space Station program including environmental monitoring devices, microgravity countermeasures for crew health, and emergency medical equipment. Led independent investigation of cracks discovered in structural polymer application in Shuttle wing instrumentation making recommendations on testing programs to verify safety. Developed reliability and safety test plans and analyzed and validated results. Conducted ground and on-orbit safety audits. Conducted investigations of reported field failures and recommended mitigation strategies. Conducted internal training courses in Structural Hazards, Failure Modes and Effects Analysis, and System Reliability Analysis, as well as coordinating the department training program.

**1998 – 2000**      **Math and Physics Teacher**, U.S. Peace Corps, Kankalabé, Guinea, West Africa

Taught 9th, 11th, and 12th grade Mathematics and 12th grade Physics in French. Managed a school renovation project that resulted in 3 additional classrooms and directed the pilot phase of a national environmental science project in 8 schools across Guinea.

## PATENT

Bayazitoglu Y. and **Gernand J.** "Spiral Microreformer Assembly." U.S. Patent 8,034,134. Oct 2011.

## PUBLICATIONS

- S. A. Blumsack, J. Gernand, M. Helbing, and H. Wiseman, "Three things Pennsylvania needs to be ready for hydrogen," *Penn Live*, Mechanicsburg, PA, USA, 14-Nov-2023 [Online]. Available: <https://www.pennlive.com/opinion/2023/11/three-things-pennsylvania-needs-to-be-ready-for-hydrogen-opinion.html>
- S. A. Blumsack, J. Gernand, M. Helbing, A. Menefee, K. Oxley, and H. Wiseman, "Policy Brief: Growing a Hydrogen Economy in Pennsylvania," Center for Energy Law and Policy, University Park, PA, USA, Oct-2023 [Online]. Available: <https://celp.psu.edu/wp-content/uploads/2023/11/Hydrogen-policy-brief-reposting-11-1-23.pdf>
- J. Gernand, "A Set of Estimation and Decision Preference Experiments for Exploring Risk Assessment Biases in Engineering Students," *ASME J. Risk Uncertainty Part B*, vol. 9, no. 1, p. 9, Mar. 2023, doi: 10.1115/1.4055156.
- V. Ramchandran and J. Gernand, "Evaluation of Risk and Uncertainty for Model-Predicted NOAELs for of Engineered Nanomaterials Based on Dose-Response-Recovery Clusters," *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems*, vol. 9, no. 1, p. 10, Mar. 2023, doi: 10.1115/1.4055157.
- M. Midlick and J. Gernand, "Economic Viability vs. Risk Mitigation: An Experimental Investigation of Project Budget Investment Decisions in Engineering Students," in *Proceedings of IMECE 2022*, 2022, vol. 9, p. 14, doi: 10.1115/IMECE2022-95484.
- J. Gernand, "The Occupational Safety Implications of the California Residential Rooftop Solar Photovoltaic Systems Mandate," *Journal of Safety Research*, vol. 82, pp. 144-150, Sep. 2022, doi: 10.1016/j.jsr.2022.05.005.
- A. McDonald, J. Gernand, N. Geyer, H. Wu, Y. Wang, and M. Wang, "Ambient Air Exposures to Arsenic and Cadmium and Overall and Prostate Cancer-Specific Survival among Prostate Cancer Cases in Pennsylvania, 2004-2014," *Cancer*, vol. 128, no. 9, pp. 1832-1839, May 2022, doi: 10.1002/cncr.34128.

- F. Ilci, M. Li, and J. Gernand, "Detailed Physico-Chemical Characterization of the Ambient Fine and Ultrafine Particulate Matter at a Construction Site," *Aerosol Science and Engineering*, vol. 5, p. 344–356, 2021, doi: 10.1007/s41810-021-00108-3.
- Z. Banan and J. Gernand, "Emissions of Particulate Matter due to Marcellus Shale Gas Development in Pennsylvania: Mapping the Implications," *Energy Policy*, vol. 148, p. 41, 2021, doi: 10.1016/j.enpol.2020.111979.
- A. Marone, C. Kane, G. Jenkins, and J. Gernand, "Characterization of Aerosol Bacteria from Dust Events in Dakar, Senegal," *AGU GeoHealth*, vol. 4, no. 6, p. 18, 2020, doi: 10.1029/2019GH000216.
- K. Lai, S. Looi, M. Li, F. Ilci, H. Naushad, and J. Gernand, "Characterization of User PM Exposure During the Application of Aerosol Mineral-Based Sunscreens Shows Minimal Risk," *Aerosol Science and Engineering*, p. 25, 2020, doi: 10.1007/s41810-020-00079-x.
- V. Ramchandran and J. Gernand, "Examining the In Vivo Pulmonary Toxicity of Engineered Metal Oxide Nanomaterials Using a Genetic Algorithm-Based Dose-Response-Recovery Clustering Model," *Computational Toxicology*, vol. 13, p. 43, 2020, doi: 10.1016/j.comtox.2019.100113.
- M. Li and J. Gernand, "Identifying Shelter Locations and Building Air Intake Risk from Release of Particulate Matter in a Three-Dimensional Street Canyon," *Air Quality, Atmosphere & Health*, vol. 12, p. 1387–1398, 2020, doi: 10.1007/s11869-019-00753-1.
- M. F. Mol, M. Li, and J. Gernand, "Particulate Matter Emissions Associated with Marcellus Shale Drilling Waste Disposal and Transport," *Journal of the Air & Waste Management Association*, vol. 70, no. 8, pp. 795–809, 2020, doi: 10.1080/10962247.2020.1772901.
- S. Agrawal and J. Gernand, "Quantifying the Economic Impact of Hydraulic Fracturing Proppant Selection of Light of Occupational Particulate Exposure Risk and Functional Requirements," *Risk Analysis*, vol. 40, no. 2, pp. 319–335, 2020, doi: 10.1111/risa.13419.
- V. Ramchandran and J. Gernand, "A dose-response-recovery clustering algorithm for categorizing carbon nanotube variants into toxicologically distinct groups," *Computational Toxicology*, vol. 11, pp. 25–32, 2019, doi: 10.1016/j.comtox.2019.02.003.
- S. S. Eslambolchi, R. L. Grayson, and J. Gernand, "Policy changes in safety enforcement for underground coal mines show mine-size-dependent effects," *Safety Science*, vol. 112, pp. 223–231, 2019, doi: 10.1016/j.ssci.2018.10.005.
- J. Gernand, "An Analysis of the Trends in US Offshore Oil and Gas Safety and Environmental Performance," in *Proceedings of IMECE 2019*, 2019, p. 10, doi: 10.1115/IMECE2019-11857.
- J. Gernand, "Understanding and Preparing for Human Bias in the Assessment of Risks," in *Safety Leadership and Professional Development*, American Society of Safety Professionals, 2018, pp. 319–332.
- J. Gernand, "A Set of Preliminary Model Experiments for Studying Engineering Student Biases in the Assessment and Prioritization of Risks," in *Proceedings of IMECE 2018*, 2018, p. 8, doi: 10.1115/IMECE2018-87888.
- V. Ramchandran and J. Gernand, "Examining Pulmonary Toxicity of Engineered Nanoparticles Using Clustering for Safe Exposure Limits," in *Proceedings of IMECE 2018*, 2018, p. 10, doi: 10.1115/IMECE2018-87431.
- J. Gernand, "Occupational Safety Implications of the Changing Energy Mix," in *Proceedings of IMECE 2018*, 2018, p. 7, doi: 10.1115/IMECE2018-86678.
- Z. Banan and J. Gernand, "Evaluation of gas well setback policy in the Marcellus Shale region of Pennsylvania in relation to emissions of fine particulate matter," *Journal of the Air & Waste Management Association*, vol. 68, no. 9, pp. 988–1000, 2018, doi: 10.1080/10962247.2018.1462866.

- S. R. Edinger and J. Gernand, "N<sub>2</sub>-BET is a Proxy for Primary Particle Size and May Not Be Representative of Available Specific Surface Area for Aggregated Nanoparticle Aerosols," *Journal of Nanoscience and Nanotechnology*, vol. 18, no. 5, pp. 3049-3058, 2018, doi: 10.1166/jnn.2018.15353.
- J. Silva, L. Li, and J. Gernand, "Reliability analysis for mine blast performance based on delay type and firing time," *International Journal of Mining Science and Technology*, vol. 28, no. 2, pp. 195-204, 2018, doi: 10.1016/j.ijmst.2017.07.004.
- J. C. York and J. Gernand, "Evaluating the Performance and Accuracy of Incident Rate Forecasting Methods for Mining Operations," *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, vol. 3, no. 4, p. 16, 2017, doi: 10.1115/1.4036309.
- J. Gernand, "Evaluation of the Risk Reduction Effectiveness in OSHA's Workplace Atmosphere Sampling Activities," in *Proceedings of IMECE 2016*, 2016, p. 6, doi: 10.1115/IMECE2016-65942.
- J. Gernand, "Limitations on the Reliability of In Vitro Predictive Toxicity Models to Predict Pulmonary Toxicity in Rodents," in *Proceedings of IMECE 2016*, 2016, p. 13, doi: 10.1115/IMECE2016-67151.
- V. Stone, H. J. Johnston, D. Balharry, J. Gernand, and M. Gulumian, "Approaches to develop alternative testing strategies to inform human health risk assessment of nanomaterials," *Risk Analysis*, vol. 36, no. 8, pp. 1538-1550, 2016, doi: 10.1111/risa.12645.
- J. Gernand, "Evaluating the effectiveness of mine safety enforcement actions in forecasting the lost-days rate at specific worksites," *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, vol. 2, no. 4, p. 6, 2016, doi: 10.1115/1.4032929.
- J. Gernand and E. A. Casman, "Nanoparticle characteristic interaction effects on pulmonary toxicity: a random forest modeling framework to compare risks of nanomaterial variants," *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering*, vol. 2, no. 2, p. 13, 2016, doi: 10.1115/1.4031216.
- E. A. Casman and J. Gernand, "Nanotoxicology: Seeing the trees for the forest," *Nature Nanotechnology*, vol. 11, no. 5, p. 405, 2016, doi: 10.1038/nnano.2016.5.
- J. C. York and J. Gernand, "Ascertainment of the Archetype Statistical Method for Incident Rate Forecasting Through Forecast Performance Evaluations," in *Proceedings of IMECE 2015*, 2015, p. 16, doi: 10.1115/IMECE2015-53138.
- J. Gernand, "Educating Engineering Students on Probabilistic Risk: Effects on the Perception of Ethics, Professional Responsibility, and Personal Agency," in *Proceedings of IMECE 2015*, 2015, p. 9, doi: 10.1115/IMECE2015-53055.
- J. Gernand, "Particulate Matter: Fine and Ultrafine—How Emerging Data on Engineered Nanomaterials May Change How We Regulate Worker Exposures to Dust," in *Proceedings of IMECE 2015*, 2015, p. 6, doi: 10.1115/IMECE2015-53056.
- J. Gernand and E. A. Casman, "A Meta-Analysis of Carbon Nanotube Toxicity Experiments - How Physical Dimensions and Purity Affect the Toxicity of Carbon Nanotubes," *Risk Analysis*, vol. 34, no. 3, pp. 583-597, 2014.
- J. Gernand and E. A. Casman, "Machine learning for nanomaterial toxicity risk assessment," *IEEE Intelligent Systems*, vol. 29, no. 3, pp. 84-88, 2014, doi: 10.1109/MIS.2014.48.
- J. Gernand and E. A. Casman, "Selecting Nanoparticle Properties to Mitigate Risks to Workers and the Public--A Machine Learning Modeling Framework to Compare Pulmonary Toxicity Risks of Nanomaterials," in *Proceedings of IMECE 2013*, 2013, p. 15, doi: 10.1115/IMECE2013-62687.
- J. Gernand and Y. Bayazitoglu, "Spiral Methanol to Hydrogen Micro-Reformer for Fuel Cell Applications," *Heat Transfer Engineering*, vol. 30, no. 14, pp. 1188-1196, 2009, doi: 10.1080/01457630902975903.

J. Gernand, “Mitigating Crew Health Degradation During Long-Term Exposure to Microgravity Through Countermeasure System Implementation,” in *Proceedings of IMECE 2004*, 2004, p. 10, doi: 10.1115/IMECE2004-59029.

## HONORS AND AWARDS

Joseph Kreutzberger Early Career Professorship in Earth and Mineral Sciences, 2022  
 Gladys Snyder Junior Faculty Grant, Penn State College of Earth and Mineral Sciences, 2019  
 Virginia S. and Philip L. Walker Faculty Fellowship, 2014  
 Gladys Snyder Junior Faculty Grant, Penn State College of Earth and Mineral Sciences, 2014  
 Bertucci Graduate Fellowship, 2012  
 Bushnell Fellowship in Engineering, 2012  
 Prim Narain Srivastava Legacy Fellowship, 2011  
 Student Merit Award, Society for Risk Assessment, Nanoscale Materials Group, 2010  
 National Science Foundation Graduate Fellowship – Honorable Mention, 2010  
 CIT Dean’s Fellowship, Carnegie Mellon University, 2009  
 Northrop Grumman President’s Leadership Award—Division Level, 2008  
 NASA Quality Assurance Special Achievement Recognition (QASAR)—JSC, 2002  
 NASA Group Achievement Award (CEVIS Fire Failure Investigation Team), 2002

## PROFESSIONAL MEMBERSHIPS

Member of the American Society of Mechanical Engineers (ASME), since 2000  
 Served as the chair of the ASME Safety Engineering and Risk Analysis Division (SERAD) in 2019-2020, while serving on the SERAD executive committee for 6 years between 2016 and 2021.

Member of the Society for Risk Analysis (SRA), since 2010  
 Served as the chair of the SRA Nanoscale Materials Specialty Group in 2016.

Member of the American Society for Quality (ASQ), since 2014

Member of the Association of Environmental Engineering and Science Professors (ASEEP), since 2025

## TEACHING AND TRAINING EXPERIENCE

Between 2000 and the present, I have conducted the following professional training and academic courses.

| Year           | Course Description   | Type of Course            |
|----------------|--|---------------------------|
| 2013 – Present | Safety Engineering.  | Undergraduate Course      |
| 2013 – Present | Engineering Risk Analysis.   | Undergraduate Course      |
| 2019 – Present | Safety and Environmental Risk Analysis.                                | Graduate Course           |
| 2014 – 2017    | Decision Support and Management for the Energy and Mineral Industries. | Undergraduate Course      |
| 2014 – 2016    | Machine Learning for Engineering Problems.                             | Graduate course           |
| 2016           | Resource Evaluation and Investment Analysis.                           | Undergraduate Course      |
| 2005 – 2006    | System Reliability Analysis  | Professional Short Course |
| 2003 – 2006    | Structural Failure Hazards   | Professional Short Course |
| 2003 – 2006    | Failure Modes and Effects Analysis (FMEA)                              | Professional Short Course |
| 1999 – 2000    | 11 <sup>th</sup> Grade Physics.  | Secondary School Course   |
| 1998 – 2000    | 9 <sup>th</sup> Grade Mathematics.                                     | Secondary School Course   |
| 1998 – 2000    | 11 <sup>th</sup> Grade Mathematics.                                    | Secondary School Course   |

## **ANALYTICAL SKILLS**

Models and Analytical Tools: Classification and Regression Trees (CART), Random Forests (RF), Artificial Neural Networks (ANN), Air pollutant dispersion modeling (AERMOD), Linear and Non-Linear Regression, Analysis of Variance (ANOVA), Time Series Analysis, Exposure assessment

Programming Languages: Visual Basic for Applications, Python, R, Matlab