Kate Willa Brown Requist

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Education

PhD Mining, Geological and Geophysical Engineering — Anticipated May 2025

Development of a Statistical Basis for the Estimation of Local Airborne Contamination Concentration in Underground Mines

University of Arizona

BS Mining Engineering — May 2022

Economic Analysis, Design and Planning of a Lithium-Boron Surface Mine Hosted in a Shale-Sandstone Complex in Chaves County, New Mexico

University of Arizona

Research Interests

Exposure Assessment, Statistics and Applied Mathematics, High Performance Computing, Miner Health and Safety, Physical Process Modeling, Exposure and Risk Modelling, Environmental and Occupational Health

Research

Research Assistant — January 2022 – Current

UArizona Mining and Geological Engineering and UArizona Mine Safety Center of Excellence

- Design and implement real-time contaminant transport monitoring systems and predictive modeling methods
- Produce digital mining health and safety training resources for mine rescue and self-escape

Engineering Dean's Fellow — August 2022 – August 2023

UArizona College of Engineering and UArizona Mining and Geological Engineering

- One-year graduate fellowship program for the development of first-year engineering doctoral students' research capacities
- Create paradigms for the sensing of dangerous air mixtures in underground coal mines utilizing geostatistical analysis of real-time sensor data

Research Member/Technical Advisor — November 2020 – Current

UArizona Mine Intelligence Research Group

- Develop excavation program for water-ice rich lunar regolith in permanently shaded regions of the moon
- Design methods for resource modelling and ore control within an entirely autonomous environment

Research Consultant April 2021 – July 2021

UArizona Mine Safety Center of Excellence and International Council for Mining and Metals

- Conducted product research to analyze the feasibility of widespread real-time particulate monitoring in underground environments
- Assisted Lowell Institute for Mineral Resources Faculty in the publication of an official International Council for Mining and Metallurgy policy statement

Research Member January 2020 – June 2020

UArizona Laboratory for Advanced Subsurface Imaging and United States Geological Survey

- Performed geophysical subsurface imaging in Patagonia, Arizona to monitor water table level
- Located near-surface massive sulfide bodies using EM geophysical study methods
- Validated the use of Function-Domain Electromagnetic survey as a supplemental survey method in near-surface applications

Visiting Researcher December 2017 – June 2018

University of Bremen Center of Applied Space Technology and Microgravity, German Center for Air and Space Travel, US Department of State, German Federal Foreign Office

- Joint program administered by US and German federal governments for diplomatic exchange of young adults
- Investigated effects of microgravity on long chain organic polymers for use in self-siphoning, semi-solid fuels applications

Teaching

Course Instructor, FE Other Disciplines Exam Preparation Spring 2024, Spring 2023

University of Arizona Department of Mining and Geological Engineering

- 7-week, non-credit NCEES Fundamentals of Engineering: Other Disciplines exam review
- In-depth review of all 15 topics included in the FE: Other Disciplines exam
- 100% pass rate for students who took the course prior to sitting the exam

Teaching Assistant, MNE 476/576 Mine Ventilation Spring 2024, Spring 2023, Spring 2022

University of Arizona Department of Mining and Geological Engineering

- Classroom and laboratory instruction of mine ventilation analysis and design with a focus on engineering thermodynamics and contaminant transport phenomena
- Preparation of study materials for students to sit the NCEES Fundamentals of Engineering exam

Teaching Assistant, MNE 419/519 Mine Planning Technology (Short Course) Jan 2024, Jan 2023, Jan 2022

University of Arizona Department of Mining and Geological Engineering

- Short course instruction for mine planning software to prepare upper-level undergraduate and graduate students for courses in surface and underground mine design
- Provide guidance for design best practices with a focus on geotechnical design constraints

Teaching Assistant, MNE 444/544 Geopositioning Fall 2023, Fall 2022, Fall 2021

University of Arizona Department of Mining and Geological Engineering

- Laboratory and in-class instruction graduate and undergraduate students in geopositioning and geomatics
- Develop course materials for hands-on laboratory sessions and computer-based coding exercises

Teaching Assistant, MNE 436/536 Surface Mine Design — Spring 2022

University of Arizona Department of Mining and Geological Engineering

- Laboratory instruction of surface mine design and production planning utilizing MinePlan mine planning software
- Provide insight for mineral resource classification, block model creation and geostatistical analysis of ore grade distribution

Course Grader, MNE 402/502 Probability and Statistics in Geologic Media — Spring 2022

University of Arizona Department of Mining and Geological Engineering

Course Grader, CE 215 Mechanics of Solids — Fall 2021, Spring 2021, Fall 2020

University of Arizona Department of Civil and Architectural Engineering and Mechanics

Course Grader, CE 218 Mechanics of Fluids — Fall 2021

University of Arizona Department of Civil and Architectural Engineering and Mechanics

Undergraduate Teaching Assistant, GEOS 251 Physical Geology — Fall 2020

University of Arizona Department of Geosciences

Industry

Project Engineer — August 2022 - Current

The University of Arizona San Xavier Underground Mining Laboratory - Tucson, Arizona

- Design ventilation systems for new excavations within the San Xavier Mine complex
- Oversee updates to geological, geotechnical, and geophysical mapping of new and existing excavations for larger geologic model development
- Manage health and safety concerns for university students and faculty as well as outside contractors
- Supervise industrial hygiene practice on site and coordinate exposure assessments and hazard controls

Geological Engineer Intern — November 2021 – January 2022

Call and Nicholas, Inc - Tucson, Arizona

- Engineered geotechnical slope stability designs for multinational mining companies
- Produced data-science backed software applications for slope stability analysis

Production Operations Intern — June 2021 – August 2021

Vulcan Materials Company - Phoenix, Arizona

- Maintained and operated comminution operations for a 15 kTPD aggregates plant
- Prepared and analyzed financial information for excavation, comminution, and sales operations

- Performed routine QA/QC of products pre- and post-comminution

Geological Engineering Intern October 2020 – December 2020

Rosemont Copper, Hudbay's Arizona Business Unit - Sonoita, Arizona

- Assisted exploration geologists in logging of drill core and geotechnical testing of samples
- Prepared core samples for shipment to assay lab

Software Trainee May 2020 – August 2020

Maptek - Remote

- Invited to participate in summer training course for young mining professionals laid off during COVID-19
- Developed skills in Maptek suite of software for economic geology, geomatics and mine engineering

Presentations and Publications

Journal Publications

Brown Requist and Momayez. 2024. Minimum Cost Pathfinding Algorithm for the Determination of Optimal Paths under Airflow Constraints. *Mining*, vol. 4, no. 3, pp. 429-446, doi: 10.3390/mining4020025 (Recent Advances in Underground Mine Planning, Scheduling, and Optimization: Theory and Applications Special Issue)

Brown Requist, Lutz and Momayez. 2024. Near real-time interpolative algorithm for modelling air quality in underground mines. *Journal of the Southern African Institute of Mining and Metallurgy*, vol. 124, no. 3, pp. 153-162, doi: 10.17159/2411-9717/2638/2024 (Computational Modelling Special Issue)

Stafford, Brown Requist, Lopez, Gordon, Momayez and Lutz. 2023. Underground Mining Self-Escape and Mine Rescue Practices: an Overview of Current and Historical Trends. *Mining, Metallurgy & Exploration*, vol. 40, pp. 2243-2253, doi: 10.1007/s42461-023-00863-6

Proceedings Publications

Brown Requist, Lutz and Momayez. (2023, June) *Leveraging Air Quality Sensing for Carbon Monoxide Transport Modeling in Underground Coal Mines*, SME APCOM 2023, Rapid City, South Dakota, USA

Brown Requist and Tenorio. (2023, March) *Infrared and Full-Spectrum Photographic Approach to Downhole Resource Estimation of Water Ice in Permanently Shaded Lunar Regolith*, SME Annual Conference 2023, Denver, Colorado, USA

Tenorio, Kingsbury, Brown, Nickels, Tolmachoff and Nail. (2022, February) *Ramp Design Fundamentals for the Excavation of Icy Regolith on the Moon,* SME Annual Conference 2022, Salt Lake City, Utah, USA

Oral Presentations

Brown Requist and Momayez. (2024, February) *Sensor Fusion Approaches to Bridge the Gap Between Personal and Area Monitoring in Underground Mines*. SME Annual Conference 2024, Phoenix, AZ, USA.

Tenorio, Brown Requist, Hunt, Gill, Riley and Downer. (2024, February) *Development of a Comprehensive Mine Plan Approach for the Extraction of Icy Regolith on the South Pole of the Moon Using Surface Mine Modelling Software*. SME Annual Conference 2024, Phoenix, AZ, USA.

Brown, Kingsbury and Tenorio. (2021, June) *Implementing Coal Mining Techniques for Water Ice Extraction in Permanently Shaded Regions of Lunar Regolith,* Planetary and Terrestrial Mining Sciences Symposium 2021, Ottawa, Ontario, Canada

Poster Presentations

Akbulut, Heath, Werner, Anani, Wellman and Brown Requist. (2023, February) *Resistivity Survey at the University of Arizona's San Xavier Mine*, SME Annual Conference 2023, Denver, Colorado, USA

Brown Requist and Momayez. (2022, December) *Self-Optimizing Interpolative Modeling Algorithm for Real-Time Monitoring in the Built Environment*, SME Arizona Conference 2022, Tucson, Arizona, USA

Brown, Kingsbury and Tenorio. (2021, April) *Descriptive Approach to Implementing Coal Mining Techniques for Water Ice Extraction in Permanently Shaded Regions of Lunar Regolith*, Luxembourg Space Resources Week 2021, Sanem, Luxembourg

Guest Talks

Introduction to Geostatistics for UArizona Mining and Geological Engineering MNE 420/520: Data Analysis and Application Development for Mining Engineering, Spring 2024. Hands-on coding exercise over 2 class periods (1.5 hrs contact time) introducing students to ordinary kriging and resource modelling.

The XZ Backdoor and the Therac-25: Time and Space Complexity and Our Duty to Others in Software Development for UArizona Mining and Geological Engineering MNE 420/520: Data Analysis and Application Development for Mining Engineering, Spring 2024. Discussion of the development of production-ready code and the importance of rigorous software testing.

Introduction to Mine Ventilation for UArizona Mining and Geological Engineering MNE 205: Introduction to Mining Engineering, Fall 2022 and Spring 2023. Discussion of basic ventilation topics and hands-on ventilation system design project.

Introduction to Mine Survey for UArizona Mining and Geological Engineering MNE 205: Introduction to Mining Engineering, Fall 2022, Spring 2023 and Spring 2024. Discussion of mine survey methods and hands-on photogrammetry and SLAM LiDAR exercises.

Convolutional Neural Networks for the Identification of Critical Minerals for UArizona College of Engineering ENGR 102HS Instructor Training, June 2022. Development, training, and validation of convolutional neural networks for a mineral identification project used in high school engineering classrooms as part of the mining engineering focus.

Media Appearances

Gleason, W. April 2024. Safety Share: Health & Safety Division presents first Dr. Jessica Elzea Kogel Mining Health & Safety Scholarship. *Mining Engineering*, vol. 75, no. 4, pp. 54,56.

Jobs of Tomorrow – Mining 2.0 Progress and Innovation in the Industry with the Society for Mining, Metallurgy and Exploration and workerbee.tv (January 2023). Discussion of current and upcoming trends in the mining industry. media.smenet.org

Jobs of Tomorrow – Community Relations: What's Mine is Yours with the Society for Mining, Metallurgy and Exploration and workerbee.tv (December 2022). Discussion of corporate social responsibility as mining continues to advance in the 21st century. media.smenet.org

Jobs of Tomorrow – Make Mine ESG with the Society for Mining, Metallurgy and Exploration and workerbee.tv (November 2022). Discussion of ESG in the mining industry and considerations the mining industry must make to minimize harm to environmental and social systems. media.smenet.org

Works in Preparation

Brown Requist and Momayez. *An Algorithm for the Efficient Placement of Air Quality Sensors in Underground Mines*. Manuscript in preparation for submission to Mining, Metallurgy and Exploration.

Brown Requist, Akbulut, Werner and Momayez. *Digital Transformation at the San Xavier Mine: Fixed Sensing for Miner Health Surveillance*. Oral presentation in preparation for presentation at Minería Digital 2024, 3-5 July, 2024, Santiago, Chile. (abstract accepted)

Akbulut, Brown Requist, Werner and Anani. *Automated Monitoring and Visual Analysis Framework for Geotechnical Risk Management in Underground Mines*. Oral presentation in preparation for presentation at Minería Digital 2024, 3-5 July, 2024, Santiago, Chile. (abstract accepted)

Brown Requist and Momayez. *Towards Site-Wide Air Mixture Monitoring: Lessons Learned from Geostatistics*. Pending presentation at International Mine Ventilation Congress 2024, 11-15 August 2024, Sydney, NSW, Australia. (manuscript accepted)

Brown Requist and Momayez. *Real-Time Contamination Monitoring using Fixed Air Sensing in Underground Mining Environments*. Manuscript in preparation for submission to Mining, Metallurgy, and Exploration.

Brown Requist, Satheesh, Brown, Lutz and Momayez. *Mine Resue and Self-Escape Survey: Current Perceptions and Availability of Training Modalities*. Manuscript in preparation for submission to Mining, Metallurgy, and Exploration.

Service and Non-Profit Experience

Local Coordinator — August 2022 - Current

Council on International Educational Exchange – South Portland, Maine (remote)

- Liaise with Tucson-area high schools and residential communities for the placement of international exchange students on F-1 and J-1 educational visas
- Conduct the vetting of potential host families and host schools for incoming exchange students
- Provide conflict resolution resources for host families/schools and exchange students currently on program

Principal Bassoon — August 2021 - Current

REEDquist Trio d'Anches – Tucson, Arizona and Kansas City, Kansas

- Professional reed trio ensemble featuring oboe, clarinet, and bassoon with performances at the University of Arizona Fred Fox School of Music

- Other members include Wren Requist, BS BM (principal oboe) and Olivia Requist, BS BM (principal clarinet)

Member August 2020 - Current

Women in Mining University of Arizona Student Chapter, Women in Mining Arizona Chapter, Women in Mining US National Chapter – Tucson, Arizona

- Professional organization for the promotion of gender parity and increased diversity within the mining industry
- Promote the retention women and underrepresented minorities in the mining industry and higher education
- Arizona student liaison to WIM Arizona, 2020-2022

Member

Society for Mining, Metallurgy and Exploration August 2019 – Current

- Active in Health and Safety Division and Underground Ventilation Committee
- Health and Safety Awards Nominating Committee member 2024 - Current

Member August 2019 - Current

Society for Mining, Metallurgy and Exploration Student Chapter

- Professional organization for students interested in the mining industry
- VP of Professional Development, 2020-2021: Coordinated biweekly speakers for the chapter and sent 30 undergraduate and graduate students to SME Annual Meeting 2020 in Phoenix, Arizona

Foreign Languages

Danish: Fluent

English: Fluent/Native

French: Intermediate

Standard German/Low German: Fluent

Norwegian/Swedish: Professional working proficiency (reading and speaking)

Spanish: Intermediate

Turkish: Intermediate