Nabeel Muhammedy

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EDUCATION

Master of Science, Geophysics May 2026

University of Houston-Main Campus, Houston, TX

Bachelor of Science, Geophysics May 2021

University of Houston-Main Campus, Houston, TX

ACADEMIC PROJECTS

Graduate March '25-Present

Airborne LiDAR and drone analysis of topographic character at Enchanted Rock, Texas

- Analyzed high-resolution airborne LiDAR and UAV photogrammetry data in ArcGIS Pro to map subtle geomorphological features and structural patterns of the Enchanted Rock granitic dome.
- Correlated curvature anomalies with geologic structures, linking positive curvature to domical uplifts and negative curvature to fracture concentrations associated with magmatic emplacement stresses.
- Validated the LiDAR-based digital elevation model (DEM) by ground-truthing against Google Earth elevation profiles to evaluate discrepancies between modeled and observed topography.

Society of Exploration Geophysicists EVOLVE Program January '23-May '24

Best Geothermal Exploration Investment Opportunity in Cooper Basin, Australia. **Presented** at IMAGE 2024

- Interpreted seismic reflection profiles and well log data to identify basement structure and geothermal targets within the Southern Cooper Basin using Kingdom and seismic attribute analysis.
- Developed regional thermal gradient and isotherm models (>120 °C) from 1281 corrected temperature measurements and integrated pseudo-3D seismic volumes with basin-scale structural mapping.
- Co-authored and presented results on geothermal prospectivity and pre-Permian basement trends at SEG Annual Meeting 2024, focusing on energy transition and subsurface thermal resources.

Reservoir Characterization for CO_2 Storage: an amended case study for the Sleipner Field. **Presented** at CCUS 2023

- Analyzed time-lapse seismic data to characterize plume migration, facies distribution, and reservoir heterogeneity within the Utsira Formation at the Sleipner CO_2 storage site.
- Built 3D reservoir models integrating logs and seismic to evaluate CO_2 storage capacity and optimize injection strategies.
- Evaluated storage capacity, economic impact, and injection optimization strategies; co-authored project summary estimating >500 Mt CO_2 capacity with modeled net savings under carbon tax scenarios.
- Projected economic impact includes potential carbon tax revenue of $45–$53 billion over 20 years based on current CO_2 pricing and estimated 500 Mt CO_2 storage capacity.

Undergraduate Research October '20-September '21

Estimating Permeability from 2D Image Analysis, University of Houston

- Illustrated a multivariate linear regression model that uses the measured characteristics of pore bodies and pore throats in thin section to estimate absolute permeability of sandstones.
- Automated image analysis workflow using in-house Quantitative Petrographic Interpretation (QPI) software to segment pore networks, apply filters, and extract morphological features.
- Presented findings at SEG First International Meeting for Applied Geoscience & Energy, demonstrating correlation between threshold settings and permeability prediction accuracy.
- Extended as graduate student: Validation of the Results of 2D Image Analysis Using Laboratory Measurements of Porosity, Permeability and NMR Measurements. **Presented** at SPWLA 2025.

EXPERIENCE

Teaching Assistant January '25-Present

University of Houston-Earth and Atmospheric Sciences

- Instructed and facilitated weekly laboratory sections for a class of ~20 undergraduate students, covering topics such as mineral and rock identification, topographic maps, geologic structures, and plate tectonics.
- Guided students through hands-on exercises, clarified key geologic concepts, and supported problem-solving.
- Evaluated and graded lab assignments in alignment with course learning objectives.

Research Assistant June '24-September '24

University of Houston-Earth and Atmospheric Sciences

- Collected ultrasonic velocity data from iron meteorite samples to determine elastic moduli and anisotropic behavior. **Presented** findings at the Lunar and Planetary Science Conference 2025.
- Prepared specimens for mechanical testing; used oscilloscope to record P- and S-wave arrivals.
- Developed and refined MATLAB scripts for waveform processing, velocity analysis, and modulus calculation.

Graduate Assistant — August ’23-May’ 24

University of Houston-Exploratory Studies Department

- Communicated information regarding course prerequisites to students.
- Maintain student records and assist students in staying on-track with their degree plan.
- Assisted with communication between academic colleges and students.

OTHER PROJECTS

SPE Pivot Datathon, Society of Petroleum Engineers — June’22-July’22

Using machine learning methods to determine optimal well-placement in Utah FORGE

• Developed workflow to determine the optimum placement of the production well that maximizes the likelihood of achieving maximum net energy and power output over a 20-year project lifespan.
• Resolved classification problem using gradient boosting on decision trees i.e., Cat Boost (F-1 score: 0.89).

SPE Geothermal Datathon — June ‘21

Using machine learning methods to estimate bottomhole temperature in Eaglebine and Duvernay basins, SPE

• Manually sort 795 different mnemonics (wireline log name) and reduced to less than 10 basic log types. Identified potential wells in the respective basins based on economic and environmental analysis.
• Multiple regression models were k-fold tested to determine which machine learning model is best. Random Forest model scored the best with NMAE: -0.0621. **Presented** at SEG Machine Learning Research Workshop 2022.
• Featured in the European Association of Geoscientists and Engineers March 2022 newsletter.

SEG Advanced Modelling Applied Geoscience GPU Hackathon — April ‘21

Separating deep signal from shallow noise in raw seismic shot gathers, Society of Exploration Geophysicists

• Trained a conditional generative adversarial network (c-GAN) to create denoised F-k plots using a synthetic dataset simulating land seismic exploration over unconventional shale reservoirs.
• Separated deep signal from shallow noise in raw seismic data (pre-stack). Mean LAD score: 0.563.

CERTIFICATIONS

HGS short course (8 professional development hours) -Well Logs: Beyond Basics. — June’22

• Topics covered: Intro to Sonic and NMR logs, Geo-steering, Geochemistry techniques for TOC etc.

Certificate in Energy Leadership — February ’22-April’22

• Four-part webinar series offered insight into the essential skills required to be a leader in the modern energy industry.

Upstream Energy Data Analytics Course — November ’20-January ’21

• Performed exploratory data analysis. Used evaluation methods (e.g., 10-fold cross validation).

SKILLS

• Computational: Petrel, GaMField, Image J, Tableau, Spotfire, Orange, MATLAB, GOCAD, Kingdom, ArcGIS Pro.
• Geophysical: Trimble GPS, RTK, SONAR, LiDAR, Magnetic Survey, Raspberry Shake, Reveal, GPR.
• Geological: Stratigraphic logging, field mapping, structure solver, mineral identification, Structure Solver.

HONOURS/AWARDS

Awards: Ambassador Award (2), Shining Stars Award, EAS Graduate Award (3), Distinguished Officer Team (PTK) President’s List, Honours Merit Scholar Award.
Scholarships: MS Excellence Scholarship, Gala Foundation Scholarship, Schulte Scholarship.

EXTRA CURRICULAR ACTIVITIES

Houston Museum of Natural Science — August ’19-Present

• Guided tours 10-15 people and hall interpretation for various age groups (5-65+).
• Communicating information to help patrons gain knowledge of the science behind the specimens.

Secretary (SPWLA-UH) and Treasurer (SEG Wavelets) — August’23-Present

• Organized events such as Student Paper Contest. Managed social media, monthly newsletter, student outreach.
• Presented at the Gulf Coast Intercollegiate Symposium and SPE Data Science Convention 2022.