

MEHNAJ JIMY

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EDUCATION

Stony Brook University

B.E. Chemical and Molecular Engineering

Stony Brook, NY

Expected May 2028

TECHNICAL SKILLS

Programming & Data: Python (pandas, NumPy, SciPy, Matplotlib), MATLAB, Git/GitHub

AI & Data Tools: ChatGPT, Claude, AI-assisted engineering workflows, scikit-learn, Random Forest, model evaluation, CUDA (beginner)

Statistical Process Monitoring: Multivariate SPC (MSPC), PCA, Hotelling T², SPE/Q, contribution analysis, virtual metrology

Engineering Software: Microsoft Office Suite (advanced): Excel, PowerPoint, Word, OneNote; AutoCAD; DWSIM (basic)

Laboratory & Characterization: ALD, QCM, TEM, STEM, spectroscopy, distillation, vacuum filtration, standard glassware, laboratory safety

RELEVANT COURSEWORK

Completed: Chemical Engineering Thermodynamics I & II, Material and Energy Balances, Programming for Engineers, Organic Chemistry I & Laboratory

Current: Unit Operations Laboratory I, Chemical Engineering Fluid Mechanics, Polymer Engineering, Numerical Methods for Chemical Engineering Analysis

TECHNICAL PROJECTS

ALD Reactor Digital Twin

July 2026 - Present

Independent Python Project

- Built a physics-based ALD reactor modeling framework in Python, coupling precursor delivery, gas transport, and surface-reaction kinetics across deposition cycles.
- Compared well-mixed and spatial channel models using synthetic ALD recipes, precursor accounting, and numerical checks.
- Built desktop and command-line tools for reproducible simulations and run comparisons; actively extending the framework.

Infineon PVD Process Monitoring & Virtual Metrology

August 2026

Independent Python Project

- Built Python workflows to analyze public Infineon AlCu and WTi PVD manufacturing datasets, including data-quality checks and 17 released metrology targets.
- Applied PCA, Hotelling T², SPE/Q, and contribution analysis to screen retrospective process excursions and identify channels driving multivariate signals.
- Trained separate Random Forest virtual-metrology models with held-out aggregate R² of 0.622 for AlCu and 0.604 for WTi; documented grouped-profile sensitivity and validation limits.

Heat and Mass Exchange Simulator

February 2026

Independent Python Project

- Developed a counter-current heat exchanger model using fluid flow rates, inlet temperatures, and exchanger dimensions to analyze thermal performance and engineering tradeoffs.
- Extended the model with membrane mass-transfer calculations based on concentration differences and membrane properties.
- Performed parameter sweeps and sensitivity analyses to compare exchanger configurations and evaluate size-performance tradeoffs.

EXPERIENCE

Lee Research Group, Stony Brook University

August 2026 - Present

Undergraduate Researcher

- Operate ALD/VPI and in-situ QCM systems after training; conduct reproducibility runs for metal-oxide infiltration and deposition in polyurethane and other polymer materials.
- Select polymer form factors and process conditions to study precursor uptake, retention, and infiltration behavior across completed research runs.
- Build Python workflows for QCM processing and kinetic analysis, comparing cycle-resolved mass changes and precursor-polymer interactions across runs.
- Relate QCM behavior to polymer and film characterization through coordinated TEM/STEM and available spectroscopy analyses, documenting process-structure relationships.

NYC Department of Education

September 2024 - Present

Substitute Paraprofessional

- Collaborate with teachers, paraprofessionals, and support staff to carry out classroom plans and maintain a safe, structured learning environment for students with individualized education programs.

- Adapt quickly across classrooms, communicate student needs to team members, and coordinate activities and transitions throughout the school day.
- Take initiative leading classroom activities and transitions when coverage is needed, helping maintain continuity and clear expectations for students.