Thomas Minh Nguyen

Davis, CA
919-619-5766 | tmhnguyen@ucdavis.edu | https://linkedin.com/in/thomas-minh-nguyen
https://thomasmhnguyen.github.io

EDUCATION

University of California-Davis Davis, CA
Ph.D. in Chemical Engineering | GPA: 3.69/4.00 Sep. 2019 - Jun. 2025
Research focus: Large-scale predictive physics-based modeling and simulations of complex systems for engineering and biomedical applications

North Carolina State University Raleigh, NC
B.S. in Chemical & Biomolecular Engineering | GPA: 3.77/4.00 Aug. 2013 - May 2017

WORK EXPERIENCE

Graduate Student Researcher Davis, CA
UC Davis Department of Chemical Engineering Jan. 2020 – Jun 2025

- Developed and maintained Python-based code-base for **multi-scale computational fluid dynamics (CFD) simulations, Multiphysics models, post-processing, and data analysis** in a start-up research setting.
- Enabled **100x faster decision-making** and **reduced analysis times by over 500 hours** by refactoring legacy simulation codebase using **object-oriented programing (OOP), version control (Git),** and **algorithm optimization.**
- Developed a **physics-informed neural network (PINN) model** to accelerate predicting heat & mass transfer in systems.
- Authored **35+** technical documents and conference presentations, translating complex modeling and data analysis results into actionable insights for non-technical audiences and stakeholders.
- ***Project:*** *Design and optimization of prototype fluidic hardware systems (**2024 - 2025**)*
    - Collaborated with experimental teams to build, apply, and refine computational predictive models based on experimental data.
    - Identified engineering design decisions that resulted in a **25% improvement** in system efficiency from **500+ CFD simulations** and **experimental data**.
- ***Project:*** *Analysis and Prediction of Structural Deformation Patterns (**2020 - 2022**)*
    - Applied **modal decomposition** and **linear stability analysis** techniques to identify dominant spatial deformation patterns in simulation data, achieving over **75% accuracy**.

Teaching Assistant Davis, CA
UC Davis Department of Chemical Engineering Jan. 2021 – Jun. 2025

- Acted as technical advisor and mentor for 100+ individual students, delivering expert guidance support for scientific programming and data analysis needs.
- Improved students' grades on subsequent assignments by at least **30%** through mentoring and detailed responses to needs.

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Post-Baccalaureate (Post-bac) Research Fellow Baltimore, MD

National Institute on Aging, NIH Oct. 2017 - Aug. 2019

- Built scalable **ELT data pipelines** with **Python** and **Bash** to automate processing of large-scale and high-dimensional biological datasets.
- Applied algorithm optimization techniques on HPC systems for probabilistic models, reducing **resource utilization by 65%** and reducing **calculation times by over 70%**.
- Diagnosed and resolved computational data quality and pipeline issues, eliminating **$15,000** in redundant data generation.
- Mentored junior researchers on automated workflows on **high-performance computing infrastructure**, increasing team productivity by **35%.**
- ***Project:*** *Statistical Analysis of Longitudinal Data (**2017 - 2019**)*
    - Developed **predictive models** of biological data diversity using **data from public databases (**NCBI SRA/GEO). Applied predictive models to own dataset to draw inferences about immune system aging.
    - Developed **advanced statistical models** for **time-series data**, improving data forecasting accuracy by at least **20%**.
- ***Project:*** *Predictive Aging Analysis of CD8+ T-cells from high-dimensional data (**2018 - 2019**)*
    - Applied a **self-organizing map machine learning model** to classify **2M+ FACS-sorted CD8+ T-cells**. Validated cluster consistency via cross-dataset correlation analysis, achieving **89%** similarity.

Flexible Volume Manufacturing Intern Durham, NC

Biogen Jun. 2017 - Aug. 2017

- Collaborated with engineers to audit and streamline reagent usage across manufacturing production, identifying **37 critical chemical reagents** for purchasing and reducing preparation time by **~16 hours/week**.
- Evaluated integration of third-party materials into existing manufacturing workflows, identifying cost-saving opportunities and reducing manufacturing expenses by **$500/month**.
- Conducted **3 process development studies**, to support clinical trial material production, complying to **FDA cGMP (21 CFR Part 210/211)** regulations.
- Conducted sensitivity analysis on process parameters for chemical mixing processes, identifying parameters that eliminated **10 hours/week** in labor.
- Utilized **SuperPro Process modeling software** to perform **protein production unit operation modeling** and **scale-up calculations**, contributing to early-stage process design and feasibility analysis.

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Small Scale Manufacturing Intern — Holly Springs, NC

Seqirus — May. 2016 - Aug. 2016

- Diagnosed production bottlenecks associated with **2x scale-up** in production of vaccine manufacturing, identifying inefficiencies contributing to a **45% drop** in overall productivity.
- Conducted **risk assessment** of process materials to determine safety impact on employees. Authored regulatory documents to execute change of process materials, minimizing **safety risk and hazards**.
- Worked with manufacturing employees to properly commission/decommission manufacturing equipment. Worked with supply chain employees to update SAP supply chain software for manufacturing processes and inventory management.

Biomanufacturing Intern — Raleigh, NC

BTEC at North Carolina State University — Aug. 2015 - May 2016

- Operated and troubleshooted **lab-scale downstream bioprocessing equipment** including UF/DF systems, centrifuges, chromatography columns, and lab equipment sensors to support protein purification and harvest workflows.
- Revised experimental protocols based on Failure Modes and Effects Analysis (**FMEA**) and Corrective and Preventative Actions (**CAPAs**) results.
- Applied DOE methodologies to optimize performance of membrane-based separation processes for biological proteins, resulting in a **20% improvement** in product quality.

Process Engineer Intern — Morrisville, NC

Integrated Project Services (IPS) — May 2015 - Aug. 2015

- Optimized workflow to review and modify **engineering schematics** (P&IDs, PFDs) for senior-level PEs and other engineers, increasing team efficiency by **25%**.
- Specified piping requirements by calculating pressure drop across pipes.

TECHNICAL SKILLS

Programming/Data Science: Python (NumPy, SciPy, Pandas, Scikit-learn, OpenCV, PyTorch), MATLAB, R
Scripting: Bash/Linux Shell, High-Performance Computing (HPC) Systems, slurm workload manager
Modeling and Simulations: Physics-based(fluid dynamics (CFD), fluid-structure interactions (FSI), thermal), numerical methods (finite differences (FDM), finite elements (FEM)), ODE/PDE solvers, predictive modeling, ML (classification, physics-baed)
Data Analysis: time-series analysis, statistical analysis, image/signal processing
Modeling Applications, Tools: COMSOL Multiphysics, Ansys Fluent, Jupyter Notebooks, GitHub, Git, GraphPad Prism, AutoCAD, Solidworks, Microsoft Office
Laboratory & Instrumentation: Mammalian/bacterial cell culture, FPLC, ELISA, SDS-PAGE, analytical assays (BCA Protein, PicoGreen, Bradford protein), pipetting, HPLC, PCR thermocyclers, brightfield/fluorescent microscopy, solution/buffer preparation, BSL-2 cabinets, fluorescence protein readers, DOE

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AWARDS

- UC Davis GSA Research Travel Award (2023)
- UC Davis GAANN Fellowship (2019)
- UC Davis TOPS Fellowship (2019)

PUBLICATIONS

Justin Maddox, **Thomas Nguyen**, … (2025). "Transport and Clogging of Fibers in Millifluidic Channels". *In Prep.*

Thomas Nguyen, Harishankar Manikantan (2024). "Cross-Streamline Migration and near-Wall Depletion of Elastic Fibers in Micro-Channel Flows". *Soft Matter* (DOI: 10.1039/D3SM01499A)

Thomas Nguyen, Harishankar Manikantan (2023). "Flow-induced buckling of elastic microfilaments with non-uniform bending stiffness". *Frontiers in Soft Matter* (DOI: 10.3389/frsfm.2022.977729)

Jaekwan Kim, **Thomas Nguyen**, … (2023). "Lysine Methyltransferase Kmt2d regulates Naive CD8+ T-cell activation-induced survival". Frontiers in Immunology (DOI: 10.3389/fimmu.2022.1095140)

Jian Lu, Guobing Chen, Arina Sorokina, **Thomas Nguyen**, … (2022). "Cytomegalovirus infection reduced CD70 expression, signaling and expansion of viral specific memory CD8+ T Cells in healthy human adults". *Immunity and Ageing*. (DOI: 10.1186/s12979-022-00307-7)

Xiaoping Sun, **Thomas Nguyen**, … (2022). "Longitudinal analysis reveals age-related changes in the T cell receptor repertoire of human T cell subsets". *Journal of Clinical Investigation* (DOI: 10.1172/JCI158122)

Jian Lu, Raheel Ahmad, **Thomas Nguyen**, … (2022). "Heterogeneity and transcriptome changes of human CD8+ T Cells across nine decades of life". *Nature Communications* (DOI: 10.1038/s41467-022-32869-x)

Annette Ko, Masashi Watanabe, **Thomas Nguyen**, … (2020). "TCR Repertoires of Thymic Conventional and Regulatory T Cells: identification and characterization of both unique and shared TCR sequences". *The Journal of Immunology* (DOI: 10.4049/jimmunol.1901006)

CONTRIBUTED CONFERENCE/RESEARCH PRESENTATIONS

Thomas Nguyen, Justin Maddox, … (Oct. 2024). "Transport and Clogging of Fibers in Millifluidic Channels". *American Institute of Chemical Engineers Annual Meeting*. San Diego, CA.

Thomas Nguyen, Harishankar Manikantan (Nov. 2023). "Signatures of cross-streamline migration of elastic fibers in microscale flows". *76th Annual Meeting of the APS Division of Fluid Dynamics*. Washington D.C.

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Thomas Nguyen, Harishankar Manikantan (Oct. 2022). "Buckling and Transport of Heterogeneously Stiff Elastic Fibers in Microscale Flows". *American Institute of Chemical Engineers Annual Meeting.* Phoenix, AZ.

Thomas Nguyen, Harishankar Manikantan (Oct. 2021). "Structural Instability and Transport of Flexible Fibers with Non-Uniform Rigidity". *American Institute of Chemical Engineers Annual Meeting.* Boston, MA.

Thomas Nguyen, … (2019) "Longitudinal analysis of the Alpha/Beta TCR repertoire reveals distinct features of CD4+ and CD8+ T cells and their changes with age." National Institutes of Health Post-Bac Poster Day. Bethesda, MD.

Thomas Nguyen, … (2019) "Longitudinal analysis of the Alpha/Beta TCR repertoire reveals distinct features of CD4+ and CD8+ T cells and their changes with age." National Institute on Aging Post-Bac Poster Day. Bethesda, MD.

Thomas Nguyen (2019). "Longitudinal analysis of alpha-beta TCR Repertoire of Human CD4+ and CD8+ T-cells reveal distinct age-associated changes." Laboratory of Molecular Biology and Immunology-National Institute on Aging. Baltimore, MD.

Jian Lu, Raheel Ahmad, **Thomas Nguyen**, … (2019) "Single Cell RNA-Seq and Multi-Color Flow Cytometry analyses reveal fine composition of human CD8+ T cells." Cold Spring Harbor Laboratory Systems Immunology Conference. Cold Spring Harbor, NY.

Thomas Nguyen, … (2018). "TCR Sequences of mouse conventional and regulatory CD4+ T cells are similar in the periphery, but distinct in the thymus." National Institutes of Health Immunology Interest Group Workshop. Leesburg, VA.

Thomas Nguyen, … (2018). "TCR Sequences of mouse conventional and regulatory CD4+ T cells are similar in the periphery, but distinct in the thymus." National Institutes of Health Post-bac Poster day. Bethesda, MD.

Thomas Nguyen, … (2018). "TCR Sequences of mouse conventional and regulatory CD4+ T cells are similar in the periphery, but distinct in the thymus." National Institute on Aging Post-bac Poster day. Baltimore, MD.