Yash Chainani

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Summary

I am a final-year PhD candidate in the Chemical and Biological Engineering department at Northwestern University. My research broadly focuses on the development of machine learning algorithms to accelerate the biomanufacturing of valuable commodity chemicals. My work has been published in accredited, peer-reviewed journals, such as *Nature Communications* and has been presented at domestic as well as international conferences. Outside of academia, I am passionate about bringing research solutions to commercial markets and helped set up Nucleate Chicago, Chicago's first student-run science accelerator for scientist trainees interested in biotechnology entrepreneurship.

Education

University of California, Berkeley *Aug 2017 – May 2021*
BS in Chemical Engineering

- **Thesis:** Development and implementation of signal-inversion algorithms for the elucidation of underlying crystallite size distribution and mass transport limitations in heterogeneous zeolites catalysts.
- **Awards:** Undergraduate Summer Research Grant awardee x 2 (2019 and 2020), Dean's List (Fall 2020).
- **Thesis advisor:** Dr. Enrique Iglesia.
- **Key coursework:** Fluid Mechanics, Separations, Heat and Mass Transfer, Thermodynamics, Reaction Kinetics, Computational Methods in Chemical Engineering, Foundations of Data Science, Principles and Techniques of Data Science.

Northwestern University *Sept 2021 – present*
PhD, Chemical and Biological Engineering

- **Thesis:** Harnessing artificial intelligence techniques to accelerate the design of biosynthetic pathways for the biomanufacturing of valuable commodity chemicals, biofuels, and therapeutics.
- **Awards:** Center for Leadership fellow (2022), Biotechnology Training Program fellow (2022), The George thodos Teaching award in chemical engineering (2023), IDEAS certificate in Data Science (2023).
- **Thesis committee:** Dr. Linda Broadbelt (co-advisor), Dr. Keith Tyo (co-advisor), Dr. Danielle Tullman-Ercek, and Dr. Christopher Henry.
- **key coursework:** Deep Reinforcement Learning, Deep Learning, Commercializing Innovations (taken with Kellogg School of Management), Technology Venture Capital (taken with Kellogg School of Management), Fluid Mechanics, Thermodynamics, Reaction Kinetics, Heat and Mass Transfer.
- **Research mentees:** Kenna Roberts (Jan 2025 - present; PhD student), Margaret Guilare-Silva (Jun 2023 - present; undergraduate student)

Experience

Machine Learning Intern Cambridge, MA
Tatta Bio May 2025 – Aug 2025

Research affiliate and computational biologist Emeryville, CA/ remote
Joint BioEnergy Institute (Lawrence Berkeley National Laboratory) Jan 2023 – present

Co-Directory of Strategy Evanston, IL
Nucleate Chicago Jun 2022 – Jun 2024

Graduate Research Assistant (PhD candidate) Evanston, IL
Northwestern University Sept 2021 – present

Undergraduate Research Assistant Berkeley, CA
University of California, Berkeley Jan 2019 – May 2021

Publications

Chainani, Y., Diaz, J., Guilarte-Silva, M., Blay, V., Zhang, Q., Sprague, W., Tyo, K.E., Broadbelt, L.J., Mukhopadhyay, A., Keasling, J.D. and Martin, H.G., 2025. Merging the computational design of chimeric type I polyketide synthases with enzymatic pathways for chemical biosynthesis. *Nature Communications*, 16(1), p.5787. https://doi.org/10.1038/s41467-025-61160-y

Chainani, Y., Ni, Z., Shebek, K.M., Broadbelt, L.J. and Tyo, K.E., 2025. DORA-XGB: an improved enzymatic reaction feasibility classifier trained using a novel synthetic data approach. *Molecular Systems Design & Engineering*, 10(2), pp.129-142.
https://10.1039/D4ME00118D

Chainani, Y., Bonnanzio, G., Tyo, K.E. and Broadbelt, L.J., 2023. Coupling chemistry and biology for the synthesis of advanced bioproducts. *Current Opinion in Biotechnology*, 84, p.102992.
https://doi.org/10.1016/j.copbio.2023.102992

Oral Presentations

2023 Contextualizing Your Research Conference, "Harnessing machine learning for the prediction of feasible enzymatic reactions in the design of novel biosynthetic pathways.", Evanston, IL, USA

2023 Joint BioEnergy Institute Annual Meeting, "Biosynth Pipeline: Merging the Design of Chimeric Type I Polyketide Synthases with Enzymatic Reactions for Chemical Biosynthesis.", Sonoma, CA, USA

2024 American Institution of Chemical Engineers, Annual Meeting, "TridentSynth: Merging the Design of Chimeric Type I Polyketide Synthases with Enzymatic Reactions and Organic Chemistry for Chemical Biosynthesis.", San Diego, CA, USA

2025 American Institution of Chemical Engineers, Annual Meeting, "Accelerating the computational design of biosynthetic pathways with machine learning", Boston, MA, USA

Poster Presentations

2020 University of California, Berkeley, College of Chemistry Undergraduate Research Fair, "Development and implementation of signal-inversion algorithms for the elucidation of underlying crystallite size distributions in heterogeneous catalysts.", Berkeley, CA, USA

2021 University of California, Berkeley, College of Chemistry Undergraduate Research Fair, "Development and implementation of signal-inversion algorithms for the elucidation of underlying crystallite size distributions in heterogeneous catalysts.", Berkeley, CA, USA

2022 Central United States Synthetic Biology Workshop, "De novo design of novel biosynthetic pathways for the biomanufacturing of valuable commodity chemicals.", Madison, WI, USA

2023 Engineering Biology Research Consortium, "Harnessing machine learning for the prediction of feasibile enzymatic reactions in the design of novel biosynthetic pathways.", Evanston, IL, USA.

2023 International Metabolic Engineering Conference, "Harnessing machine learning for the prediction of feasibile enzymatic reactions in the design of novel biosynthetic pathways.", Singapore, Singapore.

2023 Joint BioEnergy Institute, Department of Energy Annual Review, "Biosynth Pipeline: merging the design of chimeric type I polyketide synthases with enzymatic reactions for chemical biosynthesis.", Emeryville, CA, USA

2024 Joint BioEnergy Institute, Department of Energy Annual Review, "TridentSynth: merging the design of chimeric type I polyketide synthases with enzymatic reactions and organic chemistry for chemical biosynthesis.", Emeryville, CA, USA

2025 Society of Industrial Microbiology, Natural Product Discovery in the Genomics Era, "TridentSynth: merging the design of chimeric type I polyketide synthases with enzymatic reactions and organic chemistry for chemical biosynthesis.", San Diego, CA, USA

2025 Department of Energy Genome Sciences Meeting, "TridentSynth: merging the design of chimeric type I polyketide synthases with enzymatic reactions and organic chemistry for chemical biosynthesis.", Washington DC, USA

Peer review service

American Chemical Society Synthetic Biology (1 article)
American Chemical Society Omega (1 article)

Teaching

CHEM ENG 210 (Analysis of Chemical Process Systems)	Spring 2022
CHEM ENG 210 (Analysis of Chemical Process Systems)*	Spring 2023
CHEM ENG 210 (Analysis of Chemical Process Systems)	Fall 2023
CHEM ENG 210 (Analysis of Chemical Process Systems)	Fall 2024

*Awarded the George Thodos Teaching Award