

# Niels Roubailo

## EXPERIENCE

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### New Jersey Institute of Technology

Sep. 2024 - May 2025

*Undergraduate Researcher (Protein Engineering)*

Newark, NJ, USA

- Developed a 400% increase in enzyme activity through directed evolution experiments by identifying and introducing amino acid mutations
- Screened over 5,000 enzymes for activity through UV-Vis spectroscopy assays
- Improved enzyme library size by 600% by refining error-prone PCR
- Designed over 200 primers for mutagenesis to generate enzyme libraries
- Increased enzyme yield by 40% by cultivating and transforming *E. coli* strains to express evolved enzymes
- Confirmed superior enzymes by analyzing performance and degradation kinetics using mass spectrometry and NMR

### Institute of Experimental Immunology, University of Zürich

Jun. 2024 - Aug. 2024

*Summer Research Intern (Innate Lymphoid Cells and Cancer Laboratory)*

Zürich, Switzerland

- Collected organ samples from over 50 mice by performing dissections and tissue extractions for immunological analysis
- Acquired data from over 100 mice samples by conducting spectral flow cytometry assays
- Performed staining of samples using primary and secondary antibodies to detect genetic cell markers
- Evaluated immune cell populations by analyzing flow cytometry data using FlowJo
- Genotyped over 300 mice by performing PCR and DNA electrophoresis tests

### Institute of Experimental Immunology, University of Zürich

Jun. 2023 - Aug. 2023

*Summer Research Intern (Innate Lymphoid Cells and Cancer Laboratory)*

Zürich, Switzerland

- Purified over 100 samples for flow cytometry experiments and assisted with machine runs
- Maintained over 30 cancer cell cultures from human patients
- Maintained and managed over 20 laboratory mice cages to support ongoing in vivo experiments
- Genotyped over 200 mice by performing PCR and DNA electrophoresis tests

## EDUCATION

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### University of Pennsylvania

Aug. 2025 - May 2027

*Master of Biotechnology - Biopharmaceuticals Concentration*

Philadelphia, PA, USA

- Widjaja Engineering Entrepreneurship Fellows Program
  - 1 of 12 students selected for a work-study program in technology venture leadership
- Coursework: Quantitative Drug Design, Tissue Engineering, Nanoscale Systems Biology, Drug Discovery and Development, Nano-Transport, Controlled Release Systems, Molecular Biology, Organic Chemistry

### New Jersey Institute of Technology

Sep. 2022 - May 2025

*BS. in Biochemistry*

Newark, NJ, USA

- Albert Dorman Honors College
  - Summa Cum Laude, GPA: 3.95/4.0
  - 6x Dean's List Award (Spring 2025, Fall 2024, Spring 2024, Fall 2023, Spring 2023, Fall 2022)

## PROJECTS

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### Kinetic Model for a Bispecific T-cell Engager (BiTE) in a Mouse Model of Leukemia

Developed a computational model to study binding kinetics of a bispecific antibody with CD3 and CD20 antigens to model drug-target interactions and steady-state dynamics. Evaluated therapeutic efficacy, safety, and binding affinity

### Kinetic Activation Model of an MMP-Cleavable Bispecific T-Cell Engager Prodrug

Modeled the kinetic activation of an enzyme-cleavable bispecific T-cell engager to study how protease concentration regulates CD3 binding site unmasking. Calculated drug exposure for each MMP level

## PUBLICATIONS

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### Directed Evolution of Leaf-Branch Compost Cutinase for Improved Nano-Polyethylene Terephthalate Degradation

ACS Catalysis, Submitted Nov. 2025

## SKILLS

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**Additional Skills:** Plasmid Construction/Transformation, Filtration Chromatography, Protein Purification, SDS-PAGE, Western Blot, Python, MATLAB, Kinetics, Molecular Modeling, Data Visualization, Differential Equations, Microsoft Office

**Language Proficiency:** Fluent in English, German and Russian. Intermediate in Spanish and French

**International & NCAA Athlete:** Netherlands National Fencing Team, World Rank: 338, 3-Time National Champion Men's Fencing NCAA Division I, 2025 NCAA Championships Qualifier, 2025 Team MVP