

Fox Baudelaire

Profile

Researcher and lifelong learner aiming to specialize in theory and computation from statistical mechanics and neighboring areas of physical chemistry to solve problems at the chemistry-biology interface.

Education and Training

Fulbright U.S. Student Fellowship, 09/2023 – present **Toronto Metropolitan University**
Toronto, ON, Canada

Fulbright Canada Research Award

Research Advisor: Aidan Brown, Ph.D.

Project: *Quantitative modeling of the performance and kinetics of chaperone-mediated protein folding*

Master of Science (M.S.), 08/2021 – 04/2023 **University of Michigan**
Ann Arbor, MI

Molecular, Cellular, and Developmental Biology

Research Advisor: Randy Stockbridge, Ph.D.

Thesis: *Toward accessible bioinformatic tools for analyzing residue coevolution and sequence-fitness relationships in Fluc family proteins*

Bachelor of Science (B.S.), 08/2017 – 05/2020 **Brandeis University**
Waltham, MA

Biological Physics and Chemistry

Minor in Philosophy

Associate of Science (A.S.), 09/2015 – 05/2017 **Bunker Hill Community College**
Boston, MA

Biology

Research, Teaching, and Laboratory Experience

Visiting Scholar **Toronto Metropolitan University**
Toronto, ON, Canada

09/2023 - present

- Object of study is a protein folding mechanism assisted by the chaperone proteins calnexin and calreticulin; its goal is to apply quantitative theory and computer programming to model this process, with a focus on how the rates of the chaperone-assisted cycle change due to a protein's folding pathway, how a greater number of folding steps affect cycle kinetics, and how thermodynamic variables influence the reversibility of steps in this mechanism.
- Project will culminate in a poster to be presented at conferences of interest in Canada and the United States.

Graduate Research Associate **University of Michigan**
Ann Arbor, MI

07/2021 - 04/2023

- Thesis project developed scripts in Python and R in order to quantify and depict mutational tolerance in variants of Fluc membrane channel proteins and also ascertain the charge bias of Fluc monomers to predict their assumed orientation with respect to the membrane.
- Sketched out further experimental goals for gauging mutational tolerance of Fluc-encoding gene on *E. coli* fitness in fluoridated and non-fluoridated conditions; method of choice is deep mutational scanning, an approach that utilizes next-generation sequencing on representatives that have survived a defined selection pressure (in this case, survival of transformed *E. coli* under controlled fluoride stress conditions).

Research, Teaching, and Laboratory Experience (cont.)

Graduate Student Instructor

University of Michigan

01/2022 - 04/2022 and 08/2022 - 12/2022

Ann Arbor, MI

- Responsible for the programming of three discussion/recitation sections for a large-lecture course in biochemistry (MCDB 310 – Introductory Biochemistry) during the Winter 2022 and Fall 2022 terms.
- Graded and provided detailed feedback to a range of assignments and assessments including quizzes and short-answer tasks; promoted positive student outcomes through the establishment of a supportive learning environment and culture receptive to student needs.
- Enhanced student learning through the development of inquiry-guided practice materials and optimization of a wide range of instructional and communicative approaches for the course content.
- Provided one-on-one support and counsel to students through regularly held office hours.

Research Scientist

Albany Molecular Research, Inc.

12/2020 - 07/2021

Buffalo, NY

- Applied methods in the expression and purification of recombinant proteins and protein conjugates from bacterial, baculovirus-insect, and mammalian expression systems via large-scale expression platforms.
- Performed custom batch-binding and FPLC-assisted purification of His-tagged proteins by Ni-NTA affinity, Resource Q anion exchange, and size exclusion chromatography preparations; evaluated protein purity by SDS-PAGE and Western blot analyses. Trained in insect cell culture (Sf9), setup of vapor diffusion crystallization screens, and viability analysis using an automated cell counter.
- Maintained comprehensive experimental records using an electronic notebook (ELN) and regularly presented data to team members and company clients working in drug development.

Process Technician

Broad Institute of MIT and Harvard

08/2020 - 12/2020

Cambridge, MA

- Facilitated automated RNA extraction and RT-PCR workflows; human specimen handling, data classification and management according to standard operating procedures and BL2 (Biosafety Level 2) precautions for the institute's Genomics Platform and nationally recognized COVID-19 testing capacity.
- Part of a fast-paced, high-throughput testing environment incorporating liquid-handling machinery capable of performing thousands of SARS-CoV-2 tests on a daily and continuous basis.
- Attended professional development workshops and lectures on past and ongoing research at the institute.

Research Assistant

Brandeis Materials Research Science and Engineering Center

11/2018 - 12/2019

Waltham, MA

- Contributed to the design, fabrication, and optimization of a microfluidic device capable of screening from multiple user-defined mixtures of precipitant solution and protein solution what conditions are most amenable to the crystallization of a globular protein of interest.
- Methods included *in silico* design of the device using AutoCAD, fabrication of device prototypes by SU-8 photolithography and PDMS soft lithography, plasma-activated bonding, optical profilometry, and the use of a microfluidic pump to test prototypes.
- Funded through the Martin A. Fisher School of Physics and the center's 2019 Research Experiences for Undergraduates (NSF REU) summer program *Bioinspired Soft Materials*. Work was presented during a poster session and conference in August 2019.

Research Assistant

University of Massachusetts - Boston

06/2017 - 08/2017

Boston, MA

- Worked on a project to purify and characterize polyphenol oxidase isozymes from *Hordeum vulgare* (barley). Experimental methods included buffer preparation, centrifugation, agarose gel electrophoresis, native PAGE and activity staining, ion exchange chromatography, and UV spectroscopy. Hosted by William Hagar, Ph.D.
- Funded through the *Bridges to the Baccalaureate* Research Training Program of the National Institutes of Health. Presented work in a showcase at the end of the program.

Professional Development and Certifications

U-M Graduate Teacher Certificate – University of Michigan **05/2023**
Achieved a greater understanding and skillset for better teaching at the college level; participated in workshops and sessions on topics pertinent to classroom climate, student engagement, and instructional strategies. Composed a teaching statement and a mock syllabus for a course in undergraduate biochemistry.

Professional Development Certificate in Diversity, Equity, and Inclusion – University of Michigan **05/2023**
Completed training in DEI (diversity, equity, inclusion) and an individualized assessment of cultural competency, administered by Rackham Graduate School; gained knowledge of DEI-related concepts and definitions.

Data Analysis with Python: Zero to Pandas – Jovian.com and freeCodeCamp **10/2020**
Engaged in a practical, coding-intensive course covering the basics of Python, Numpy, and Pandas as well as their use in data analysis and visualization. Received a certificate of accomplishment.

Statistical Molecular Thermodynamics – Coursera.org course, University of Minnesota **02/2019**
Reinforced an understanding of classical and statistical thermodynamics. Used Coursera.org, a massive open online course (MOOC) platform, to earn a verified certificate of achievement in the course.

Honors and Awards

Fulbright Canada Research Award, Fulbright U.S. Student Program **09/2023 – present**
In receipt of a grant to conduct research in Canada during the 2023-2024 academic year through the flagship international educational exchange program of the U.S. government.

Selected Participant - Graduate Student Mentorship Initiative, Científico Latino **08/2023 – present**
Selected by competitive application to benefit from mentorship, advising, and other resources for applying to Ph.D. programs. Program sponsored in part by the Simons Foundation.

Rackham Merit Fellowship, University of Michigan **07/2021 – 04/2023**
Awarded a competitive fellowship in full coverage of a stipend (valued annually at \$33,720), tuition, and health care benefits while in attendance at Rackham Graduate School for a two-year master's degree.

Broad Institute Special Recognition Award, Broad Institute of MIT and Harvard **12/2020**
Conferred upon all involved in operating and managing the Genomics Platform's COVID-19 diagnostic laboratory and for contributing to its ability to process over 100,000 tests daily, with an average test turnaround time of less than 24 hours and an estimated 4-5% of all SARS-CoV-2 tests performed in the United States.

Ting Tsung and Wei-Fong Chao Endowed Scholarship, Brandeis University **08/2019**
Matched with a generous named scholarship; mentioned in online alumni publication.

Undergraduate Departmental Representative (UDR) Recognition Prize, Brandeis University **05/2019**
Recognized for initiatives undertaken as a departmental representative to the undergraduate program in Biological Physics, including an event to generate interest in the founding of an undergraduate science publication.

Selected Participant - Global Community Bio Summit 2.0, MIT Media Lab **10/2018**
Selected to take part in a function to gather members of the do-it-yourself biology (or "biohacking") movement, largely comprised of individuals working outside academia and industry. Biographical sketch featured on program website: <https://archive.biosummit.org/fox-baudelaire-2018>

Citation, Massachusetts House of Representatives **09/2018**
Commended for participating in the Massachusetts Citizens' Initiative Review, a civic engagement project to compose a white paper of essential information regarding the measure proposed in Question 1 of the 2018 midterm election in Massachusetts (proposed regulation of the number of patients assigned to nurses).

Honors and Awards (cont.)

Fellow - Generation One Fellows Network , Brandeis University Selected for a program to build community among first-generation college students.	03/2018
Pearl Anniversary Scholar , Bunker Hill Community College Foundation Received a competitive scholarship for the 2016-2017 academic year; mentioned in printed material.	09/2016
Member , Phi Theta Kappa Granted membership through the academic honor society's Alpha Kappa Mu chapter at Bunker Hill Community College.	08/2016
First Place - 2014 Brain Bee Challenge , Max Planck Florida Institute for Neuroscience Awarded in a quiz-style competition of high school students testing general knowledge of neuroscience.	03/2014

Conferences, Symposia, and Workshops Attended

† Denotes an event in which a presentation or talk was delivered.

<i>Beauty in Science: An Interdisciplinary Conversation</i> – Magdalen College, University of Oxford (remote)	09/14/2022
2020/2021 PSA Biennial Meeting – Philosophy of Science Association (remote)	11/11/2021 – 11/14/2021
Forum on Microbial Metabolism – Kavli Institute for Theoretical Physics (remote)	01/14/2021 – 03/18/2021
<i>Biophysicists Address COVID-19 Challenges</i> – Special Symposium, Biophysical Society (remote)	10/29/2020
2020 Multi-Scale Modeling Summer School – Indiana University Bloomington (remote)	07/27/2020 – 08/08/2020
<i>Code in Place</i> – Stanford University (remote) Completed a 5-week introductory online Python course based on material from the first half of Stanford's introductory programming course, CS 106A.	04/13/2020 – 05/22/2020
† SciFest IX Summer Symposium and Poster Session – Division of Science, Brandeis University Presented a poster, <i>Steps in the development of a microfluidic device for protein crystallization</i> , by Baudelaire, F.*, Aghvami, S. A., and Fraden, S. (2019).	08/08/2019
Genome Engineering Workshop 2019 – Lab of Feng Zhang, Broad Institute	05/19/2019
2019 SACNAS New England Regional Meeting – Division of Science, Brandeis University	03/23/2019
20 th Annual Greater Boston Area Statistical Mechanics Meeting – Brandeis University	10/27/2018
<i>Molecular Robotics</i> – 9 th Annual Wyss International Symposium, Wyss Institute	09/21/2018
<i>Metabolism and Life</i> – 2018 Sabri Ülker Center Symposium, Harvard University	05/29/2018 – 05/30/2018
† <i>Bridges Data Blitz</i> – 2017 Bridges to the Baccalaureate Program, University of Massachusetts - Boston	08/10/2017
<i>The Past, Present, and Future of DNA</i> – 2015 Radcliffe Institute Science Symposium, Radcliffe Institute	10/02/2015

Leadership Activities and Other Experience

Alumni Representative , SACNAS - Brandeis University Chapter	05/2020 – 04/2021
<ul style="list-style-type: none">Served to connect students with SACNAS (Society for the Advancement of Chicanos/Hispanics & Native Americans in Science) following a period of continued involvement with the organization as an undergraduate student at Brandeis University.	

Leadership Activities and Other Experience (cont.)

Contact Tracer and Case Investigator, Partners in Health **04/2020 – 07/2020**

- Part of the Massachusetts COVID-19 Community Tracing Collaborative, one of the first initiatives of its kind to be deployed in response to the COVID-19 pandemic. Educated COVID-19 affected individuals about isolation and quarantine procedures, collecting information on these cases in a professional and empathetic manner, and referred them to various social services, clinical care, and other assistance. Ensured accurate reporting of information using Salesforce, a client resource management (CRM) platform, for case monitoring and follow-up.

Conference Organizer and Technical Assistant, Brandeis University **03/2020 – 07/2020**

- Served on the organizing committee of WeSSLLI 2020 (Web Summer School for Logic, Language, and Information), a linguistics conference emergent from two previously separate endeavors in response to the COVID-19 pandemic and made possible through the collaboration of organizers from across North America (North American Summer School for Logic, Language, and Information) and Europe (European Summer School for Logic, Language, and Information). Mentioned in program documentation.

Lead Undergraduate Departmental Representative, Brandeis University **08/2019 – 05/2020**

- A leadership position that extends the duties of the subordinate Undergraduate Departmental Representative role (of acting as a liaison between faculty, staff, and students of an undergraduate major or concentration) to include greater involvement with division leadership in the university's School of Arts and Sciences.
- Assessed program-related activities and exchanged forward-thinking ideas in meetings with senior academic administrators. Promoted from a prior role as an Undergraduate Departmental Representative to the major in Biological Physics (held since August 2018).

Volunteer - *March for Science*, Biophysical Society **04/22/2017**

- Coordinated the gathering of members of the Biophysical Society for participation in the inaugural *March for Science* event in Washington, D.C., escorting them from a point of rendezvous to the Washington Monument.

Bookseller, NewsLink of Boston, LLC. **09/2015 – 09/2019**

- Curated the Natural Science, Philosophy sections of a semi-independent bookstore (BookLink) located in Boston Logan International Airport. Roles included review of new titles for ordering, contribution to data entry using spreadsheet software, customer assistance, and general maintenance of the store grounds.
- Held position while in attendance at Bunker Hill Community College and at Brandeis University.

Selected Skills

Column chemistries for protein purification (e.g. ion exchange, size exclusion, metal affinity)	Use of Windows and Macintosh OS; familiarity with Linux (Ubuntu) and associated BASH command line
Nucleic acid quantitation by fluorimeter, UV spectroscopy; Protein quantitation by colorimetric assay	Python (esp. data analysis with Pandas, Numpy), R; working familiarity with MATLAB
Preparation and transformation of competent bacteria	Molecular biology software (e.g. SnapGene, Benchling)
Plasmid DNA preparation; PCR; Golden Gate cloning	Protein visualization with Biopython and PyMOL
Gel electrophoresis for nucleic acids and proteins	Circular dichroism for protein characterization
Protein chromatography by FPLC (AKTA™)	Photolithography, soft lithography for microfluidics
Protein crystallization by vapor diffusion	3D optical profilometry; basics of optical laser tweezers
Semi-dry transfer Western blotting	Academic and technical writing
Selective and differential bacterial cell culture	Rhetoric, argument, and public speaking