

Casey Patrick Prior O'Brien

City: Raleigh, NC; Phone: (402)669-5166; Email: cpobrie6@ncsu.edu

Education

North Carolina State University, Raleigh, NC, Expected Graduation: May 2027

PhD Student in Biomathematics, PhD Student with Genetics and Genomics Scholars

GPA: 4.0/4.0

University of Pittsburgh, Pittsburgh, PA, Graduated: May 2021

Bachelor of Science with a double major in Computational Biology and Mathematical Biology

GPA: 3.617/4.0

Cultural Experiences Abroad (CEA), Dublin, Ireland (Summer, 2019)

Awards and Fellowships

Culver Prize for outstanding performance in Mathematics

University of Pittsburgh Department of Mathematics (May 2021)

Lucas Best First Year Student Award

North Carolina State University Biomathematics PhD Program (May 2023)

Genetic Engineering Society Minor Fellowship

North Carolina State University (August 2024-December 2024)

Work Experience

Private Tutor; (May 2023-present)

- Tutor high school students in math

Graduate Teaching Assistant, NCSU; (August 2023-present)

- Host office hours, grade tests, help with in class problems
- Lead recitations for example problems and questions
- Tutor in the general math help center for 5 hrs a week
- Courses: Ordinary Differential Equations 1 (Fall 2023), Calculus 2 (Spring 2024)

PhD Student, NCSU; PI: Alun Lloyd (August 2022-present)

- Find and implement models for Dengue and Wolbachia to look at behavior and evaluate risks
- Develop a model that can be used to help understand and predict the effects of Wolbachia-Bearing mosquito releases
- Investigate and develop a theoretical gene drive targeting immune systems or susceptibility to an already present disease

Bioinformatics Analyst, UPMC Children's Hospital; Supervisor: Dr. Dhivyaa Rajasundaram

University of Pittsburgh (October 2021 – June 2022)

- Worked with PIs from various labs to process genomics and lipidomic data and create figures
- Wrote bash scripts to run jobs in Pitt's computing cluster

Undergraduate Research Assistant; Advisor: Dr. Bard Ermentrout

University of Pittsburgh (September 2019 – August 2021)

- Explored search algorithms used to model how a mouse might find food based on smell
- Used MATLAB and XPP to study performance of algorithms and optimization of input variables
- Presented poster titled: "Olfactory Navigation Strategies on an Experimentally Generated Plum," at the 2021 National Conference on Undergraduate Research (NCUR), April 12, 2021.

Undergraduate Research Capstone; Advisor: Dr. Miler Lee

University of Pittsburgh (January 2021 – August 2021)

- Find kmers of zebra fish 5' and 3' UTRs that are differentially expressed across stages and infer biological consequences
- Utilize Python and R to conduct analysis and data manipulation

Undergraduate Teaching Assistant, CS411 Discrete Structures

University of Pittsburgh (September 2020 – December 2020)

- Taught weekly recitations to assist students with homework questions

Assistant Pool Manager (Summer 2017) and *Lifeguard* (Summers 2014-2016, 2019)

- Led training sessions, created guard schedules, handled difficult customer interactions
- Operated, cleaned and maintained pool operating equipment, controlled water chemistry
- Coached the local swim team (2015, 2016, 2017)

Relevant Coursework (Undergraduate)

- Mathematics: Calculus 1-3, Computational Neuroscience, Math Biology, ODEs 2, Vectors Analysis, Numerical Mathematical Analysis, Numerical Math: Linear Algebra
- Biology: Computational Biology Seminar, Computational Biology, Genomics, Genetics
- Computer Science: Introduction to Data Science, Algorithm Implementation, Computer Organization

Relevant Coursework (Graduate)

- Mathematics: Uncertainty Quantification (MA540) (IP), Biomathematics (BMA771)
- Biology: Genetics and Genomics Survey course (GGS770),
- Other: Data Science for Genetics and Genomics (GGS771) (IP), Statistical methods for researchers II (STAT512) (IP), Professional Development and Ethics for Genetics and Genomics (GGS840) (IP)

Activities and Leadership

Design and Teach a Taming Selfish DNA Course (July 2023-present)

- Design a 1 credit class aimed at non-stem freshman or sophomores
- Units: Basic Genetics, Selfish DNA, Gene Drives and Their Applications, Ethics, Lab Visit
- Create and present slides, class activities, homeworks and project

Biomathematics Graduate Student Association Student Seminar Chair (April 2023-present)

- Organize seminars, reach out to potential speakers, and set up seminar room

GGS Peer Mentor (June 2023-present)

- Mentor a graduate student in the 2023 Genetics and Genomics Scholars cohort

Volunteering at Science outreach events

- Ran a booth at Bugfest 2023 about mosquitoes and disease transmission hosted by the North Carolina Museum of Natural sciences.
- Ran a booth at State of the Sciences 2023 about mosquitoes and disease transmission hosted by North Carolina State University.

Volunteering at Brassfield Elementary (February 2023)

- Gave three presentations, each an hour long, to K-5th graders about my research and general topics in genetics.

The Mathematical Contest in Modeling (Global Contest) (March 2020)

- Worked on a team of three to create a mathematical model to solve problems relating to a large data set using Python and R (received successful participant Certificate)

University of Pittsburgh Men's Rugby (August 2017 –May 2021)

Club Captain (2020) & *Recruiting Chair* (2018)

- Planned and coached practice for the 2020 fall season as COVID-19 guidelines restricted coaches from attending practice, coached B-side in 2018 when sidelined with torn ACL, led team workouts

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Publications

Fortuna TR, Kour S, Chimata AV, Muiños-Bühl A, Anderson EN, Nelson Iv CH, Ward C, Chauhan O, **O'Brien C**, Rajasundaram D, Rajan DS, Wirth B, Singh A, Pandey UB. SMN regulates GEMIN5 expression and acts as a modifier of GEMIN5-mediated neurodegeneration. *Acta Neuropathol.* 2023 Sep;146(3):477-498. doi: 10.1007/s00401-023-02607-8. Epub 2023 Jun 27. PMID: 37369805.

Rajan, Deepa, Tyler Fortuna, Sukhleen Kour, Anuradha Venkatakrishnan, Anixa Muiños-Bühl, Eric Anderson, Krithvi Dharini Ganesh, Charlie Nelson, Carolyn Ward, **Casey O'Brien**, et al. "GEMIN5 and SMN Interaction: Clue to Potential Therapeutic Targets in GEMIN5 Related Neurodevelopmental Disorder

(P7-8.001).” *Neurology* 102, no. 17_supplement_1 (April 14, 2024): 2667.
<https://doi.org/10.1212/WNL.0000000000204667>.