MADELEINE OMAN, PHD

Bioinformatician and geneticist

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TECHNICAL SKILLS

Programming & Scripting: Python, R, Bash.
Bioinformatics & Data Analysis: NGS (WGS, RNA-seq, ChIP-seq), variant calling, quality control, statistical modeling, machine learning (supervised & unsupervised).
Workflow & Reproducibility: Snakemake, Conda, Singularity, Git.
Data & Tools: Linux/HPC environments, large-scale data processing, reproducible research practices.

EXPEREINCE

Research Assistant | University of Toronto   2019-2025
- Developed, optimized, and maintained reproducible bioinformatics pipelines for high-throughput sequencing data (ecNGS, RNA-seq, ChIP-seq).
- Built statistical and machine learning models to predict mutation events from large genomic datasets.
- Implemented workflows using Python, R, Bash, and Snakemake, with environment management via Conda and Singularity.
- Applied rigorous QC, data cleaning, and validation steps to ensure reliable downstream analyses.
- Collaborated with geneticists, biologists, and statisticians to interpret results and translate analyses into biological insight.
- Communicated findings through manuscripts, presentations, and collaborative discussions.

Invited ML Talk | EMGS Genomics and Data Sciences SIG   April 2025
- Delivered applied machine learning training to 50+ toxicologists, focusing on practical use cases in clinical and genomic research.

Coding Instructor | University of Toronto Coders   2022 – 2024
- Designed and taught courses in advanced Python and machine learning for graduate students.
- Led classes of 30+ students, emphasizing reproducible workflows and best coding practices.
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Senior Program Assistant | FSG program, University of Toronto   2018 – 2022
- Built a Python pipeline to evaluate and report program performance.
- Co-led a team of 15 staff supporting 3,000+ undergrads.
- Instructed staff on science communication techniques to optimize student learning.

Program Assistant | IMACC program, University of Toronto   2020 – 2021
- Recruited, hired, and trained staff supporting international students.

EDUCATION

PhD Ecology and Evolution, University of Toronto   2019-2025
HBSc Biology, University of Toronto, *magna cum laude*   2014-2019

PUBLICATIONS

Madeleine Oman, Rob W Ness, Comparing the predictors of mutability among healthy human tissues inferred from mutations in single-cell genome data, *Genetics*, Volume 229, Issue 3, March 2025, iyae215, https://doi.org/10.1093/genetics/iyae215

Marc T J Johnson, Iqra Arif, Francesca Marchetti, Jason Munshi-South, Rob W Ness, Mathieu Szulkin, Brian C Verrelli, Carole L Yauk, Danielle N Anstett, William Booth, Anne E Caizergues, Elizabeth J Carlen, Abigail Dant, Josefa González, Carolina González Lagos, **Madeleine Oman,** Melissa Phifer-Rixey, Dylan Rennison, Michael S Rosenberg, Kristin M Winchell, Effects of urban-induced mutations on ecology, evolution and health, *Nature Ecology & Evolution*, Volume 8, 2024, Pages 1074–1086, https://doi.org/10.1038/s41559-024-02401-z

Madeleine Oman, Aqsa Alam, Rob W Ness, How Sequence Context-Dependent Mutability Drives Mutation Rate Variation in the Genome, *Genome Biology and Evolution*, Volume 14, Issue 3, March 2022, evac032, https://doi.org/10.1093/gbe/evac032

AWARDS AND GRANTS - total funding $ 129,310

2024 Heath and Environmental Science Institute (HESI), Professional Development Travel Award - $1,500 (USD)

2023 Emerging & Pandemic Infections Consortium (EPIC), Research Mobility Award - $6,000

2023 Mathematics of Information Technology and Complex Systems (MITACs) Global Link Research Award - $6,000

2022 Natural Sciences and Engineering Research Council (NSERC), Postgraduate Scholarships – Doctoral (PGS D) Program – $82,000 Canada

2021 Ontario Student Assistance Program (OSAP), Ontario Graduate Scholarship (OGS) Program - $15,000, Canada

2020 Natural Sciences and Engineering Research Council (NSERC), Canadian Graduate Scholarship Master's (CGS-M) Program – $17,500

2020 Human of Biology Award Biology department, University of Toronto Mississauga

2019 University of Toronto Robert Gillespie Academic Skills Centre, Brenda and Gary Mooney Award - $1510

SELECT CONFERENCE PRESENTATIONS

2025 - EMGS - Lessons from AI: Predicting mutability in healthy human tissues Using Single Cell Data Oman, M.*, Ness, R.

2024 - EMGS - Endogenous Predictors of Mutation in Healthy Human Tissues Oman, M.*, Ness, R.

2023 - University of Toronto Biology - Modelling the predictors of mutability variation Oman, M.*, Ness, R.

2022 - Evolution - The predictors of mutation rate variation Oman, M.*, Ness, R.

2022 - International Centre for Supplemental instruction Mapping - Providing High Quality Feedback to S.I. Leaders in In-Person and Online Sessions Oman, M*, Salim, H.