

# Kelly Sovacool

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*Bioinformatician building and applying open source tools for microbiome research, and contributing to data science education along the way.*

## Education

- 2018-present **PhD Bioinformatics**, *Dept. of Computational Medicine and Bioinformatics*, University of Michigan  
○ Advisor: Patrick D. Schloss
- 2014-2018 **BS Biology**, *Dept. of Biology*, University of Kentucky  
○ Minor: Computer Science

## Skills

- Languages & Tools R, Python, Bash, C++, Snakemake, R Markdown, Quarto, LaTeX, conda, git, GitHub, SLURM.
- Research gut microbiome composition, amplicon sequence analysis, metagenomics, supervised machine learning, data visualization, reproducible manuscripts.
- Software R package maintenance, continuous integration, high performance computing.

## Research Experience

- 2019-present **Graduate Student Researcher**, *Schloss Lab, Dept. of Microbiology and Immunology*, University of Michigan  
○ Develop and benchmark bioinformatics pipelines and software for microbial ecology.  
○ Analyze 16S rRNA gene amplicon sequence data.  
○ Apply machine learning methods to gut microbiome classification problems in colorectal cancer and *C. difficile* infection.  
○ Collaborate with other scientists on microbiome projects and mentor junior lab members.
- 2018-2019 **Rotation Student Researcher**, *Program in Biomedical Sciences*, University of Michigan  
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- 2015-2018 **Undergraduate Lab Assistant**, *Moseley Bioinformatics Lab, Dept. of Molecular and Cellular Biochemistry*, University of Kentucky
  - Developed a computational tool in Python for identifying sets of orthologous and paralogous gene products in whole genomes to facilitate collinearity analysis and detection of gene duplication events.
- 2016-2018 **BIO395 Independent Research Student**, *Weisrock Lab, Dept. of Biology*, University of Kentucky
  - Developed bash scripts and a SNP calling pipeline in Snakemake.
  - Population structure analysis of the *Ambystoma tigrinum* species complex.
  - Bayesian species delimitation of the *Desmognathus fuscus* species complex.
- 2015-2016 **Undergraduate Lab Assistant**, *Jaromczyk Lab, Dept. of Computer Science*, University of Kentucky
  - Maintained the *Epichloë festucae* genome project database.
  - Analyzed RNA-seq data of *Chenopodium quinoa* and coffee ringspot virus.

## Teaching Experience

- Jan-Apr 2023 **Graduate Student Instructor**, *Dept. of Computational Medicine & Bioinformatics*, University of Michigan
  - BIOINF 576: Tool Development for Bioinformatics
- 2019-2022 **Facilitator & Capstone Project Mentor**, *Girls Who Code at U-M DCMB*, University of Michigan
  - Weekly Club during the school year and week-long Summer Experience for high schoolers to learn Python for data science
- 2018-present **Workshop Instructor & Helper**, *U-M Carpentries*, University of Michigan
  - 2-day Software Carpentry workshops teaching computational skills for reproducible research
- Jun 2022 **Instructor**, Virtual
  - Intro to R & RNA-Seq Workshop for ASM Microbe conference attendees
- Apr 2019 **DNA Day Ambassador**, *Michigan DNA Day*, Pioneer High School, Ann Arbor, MI
  - Epigenetics & Scientific Journeys
- Mar 2019 **Workshop helper**, *Graduate Society of Black Engineers and Scientists*, University of Michigan
  - Data Visualization with Python Workshop
- Mar 2019 **Capstone Activity Leader**, *Females Excelling More in Math, Engineering, & the Sciences*, University of Michigan
  - Binary Numbers through Ozobots with GWC at U-M DCMB
- 2012-2018 **Tutor**, *freelance*
  - for high school and college students in Biology, Calculus, Chemistry, Computer Science, and Bioinformatics.

## Service

- 2019-present **Executive Committee Member: Open Source Technical Lead, *Girls Who Code at U-M DCMB***
- Plan, apply for funding, develop curriculum, and maintain resources to teach introductory Python programming & data science to young women+.
  - Facilitate collaborative development and maintenance of our open source teaching resources.
  - Organize our year-round Club and annual Data Science Summer Experience for high school women+.
- 2019-present **Organizer & Maintainer, *U-M Carpentries***
- Co-lead development & maintenance of a curriculum for workshops teaching programming skills for reproducible research.
  - Maintain the website, develop curriculum, and organize workshops.
  - Collaborate with U-M Women in Science and Engineering to organize workshops for women+.
- 2021-present **Mentor, *Schloss Lab***
- Mentor an undergraduate student in building reproducible machine learning models to predict *C. difficile* infection severity from gut microbiome composition.
- 2021-present **CoderSpaces co-host, *U-M ISR Data Science Hub***
- Hold office hours at a weekly virtual help session for data science practitioners
- 2021-present **Peer reviewer**
- PLOS ONE (1)
- 2019-2021 **Graduate Student Coordinator, *U-M Data Analysis Networking Group***
- Organize monthly meetings & a one-day symposium for researchers to sharpen their data analysis skills.
  - Apply for funding through a Rackham Interdisciplinary Workshop grant.
- 2009-present **Volunteer Sound Engineer, *various churches and non-profit organizations***
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## Open Source Contributions

### Software

**mikropml**, *User-Friendly R Package for Supervised Machine Learning Pipelines*

- Co-author and maintainer

**schtools**, *Schloss Lab tools for reproducible microbiome research (R package)*

- Co-author and maintainer

**mikropml snakemake workflow**, *Template for running mikropml with Snakemake*

- Co-author and maintainer

**mothur**, *Command-Line Tool for Processing 16S rRNA Gene Sequence Data*

- Contributor

**mothur snakemake workflow**, *Snakemake template for amplicon sequence analysis with mothur*

○ Co-author

## Curricula

**U-M Software Carpentry**, *Intro to R- the Unix shell- and git for workshops on reproducible research.*

○ Co-author and maintainer

**Girls Who Code at U-M DCMB**, *Intro to Python for Data Science for Girls Who Code clubs.*

○ Co-author and maintainer

**Code Clubs**, *Short coding tutorials for lab meetings*

○ Contributor

**U-M DANG!**, *repro-packs: Organizing projects for reproducibility and headache prevention.*

○ Author

**Intro to R & RNA-seq**, *Workshop for 2022 ASM Microbe attendees*

○ Contributor

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## Presentations

### Talks

Nov 2022 **Bioinformatics Student Research Hour**, *Predicting \_C. difficile\_ infection severity from the taxonomic composition of the gut microbiome*, University of Michigan

Feb 2022 **Seminar for the KG Jebsen Center for Genetic Epidemiology**, *Intro to git & GitHub*, (Virtual) Norwegian University of Science and Technology

Mar 2021 **Bioinformatics Student Research Hour**, *OptiFit: a fast method for fitting amplicon sequences to existing OTUs*, (Virtual) University of Michigan

Apr 2018 **Systems Biology and Omics Integration Seminar**, *Developing a Global Homology Analysis for Comparative Genomics*, University of Kentucky

### Posters

Jun 2022 **ASM Microbe**, *Predicting the severity of \_C. difficile\_ infections from the taxonomic composition of the gut microbiome*, Washington, DC

- Jun 2020 **ASM Microbe**, *OptiFit: a fast method for fitting amplicon sequences to existing OTUs*, Virtual
- Apr 2018 **Showcase for Undergraduate Scholars**, *Developing a Global Homology Analysis for Comparative Genomics*, University of Kentucky
- Apr 2018 **National Conference on Undergraduate Research**, *Developing a Global Homology Analysis for Comparative Genomics*, University of Central Oklahoma
- Apr 2016 **Showcase for Undergraduate Scholars**, *Processing RNA-seq Reads of Plants Infected with the Coffee Ringspot Virus*, University of Kentucky
- Apr 2016 **UT-KBRIN Bioinformatics Summit**, *Processing RNA-seq Reads of Plants Infected with the Coffee Ringspot Virus*, Cadiz, KY
- Apr 2015 **Showcase for Undergraduate Scholars**, *The Effect of Meditation on Performance*, University of Kentucky

## Awards

### Grants and Fellowships

- 2022 **Conference Travel Grant**, \$900, Rackham Graduate School <br> University of Michigan
- 2020-2021 **Rackham Interdisciplinary Workshop Grant**, \$500, Rackham Graduate School <br> University of Michigan
- 2020 **Conference Travel Grant**, \$800, Rackham Graduate School <br> University of Michigan
- 2019-2020 **Rackham Interdisciplinary Workshop Grant**, \$500, Rackham Graduate School <br> University of Michigan
- 2019-2021 **NIH T32 Bioinformatics Training Program Fellow**, Bioinformatics Graduate Program <br> University of Michigan