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Kelly Sovacool

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 and 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

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**, *Rackham Graduate School, University of Michigan*, $900

2020-2021 **Rackham Interdisciplinary Workshop Grant**, *Rackham Graduate School, University of Michigan*, $500

2020 **Conference Travel Grant**, *Rackham Graduate School, University of Michigan*, $800

2019-2020 **Rackham Interdisciplinary Workshop Grant**, *Rackham Graduate School, University of Michigan*, $500

2019-2021 **NIH T32 Bioinformatics Training Program Fellow**, *Bioinformatics Graduate Program, University of Michigan*

2017 **Oswald Research & Creativity Award, 2nd place in Biological Sciences**, *Office of Undergraduate Research, University of Kentucky*, $200

2017 **Summer Research Grant**, *Office of Undergraduate Research, University of Kentucky*, $2,000

2014-2018 **Presidential Scholarship**, *University of Kentucky*, out-of-state full tuition

Honors

2018 **Graduated Cum Laude with Departmental Honors in Biology**, University of Kentucky

2018 **Biology Undergraduate Research Award Nominee**, University of Kentucky

2014-2018 **Lewis Honors College**, University of Kentucky

Continuing Education

Jan 2020 **Building Tidy Tools workshop at rstudio::conf**, *Rstudio, PBC*, San Francisco, CA

Dec 2019 **Winter School in Research Software Engineering**, *US Research Software Sustainability Institute*, Seattle, WA

Jun 2019 **Software Carpentry Instructor Training**, *The Carpentries*, University of Michigan

May 2019 **PyCon Education Summit & Conference**, *The Python Software Foundation*, Cleveland, OH

Apr 2019 **MICROBIOL 612.2**, *Riffomonas Minimal R Workshop*, University of Michigan

Publications

* Indicates co-first author