

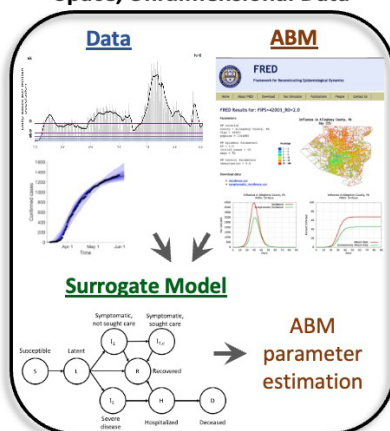
Postdoc Positions in Computational Modeling of Cancer Therapeutics and Developing Methods for Analyzing Multiscale Agent-Based Models at the University of Michigan

Applications are invited for partially NIH and NSF-funded postdoctoral associate positions within the Department of Mathematics at the University of Michigan to work with Professor Trachette Jackson and her group. Both projects are part of ongoing and successful interdisciplinary and highly collaborative efforts.

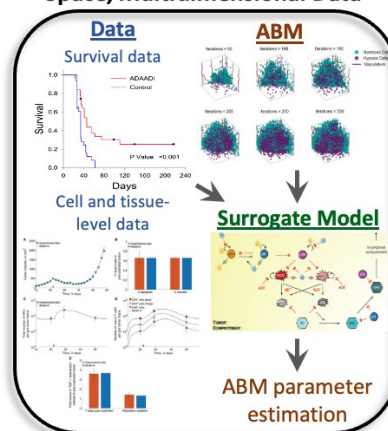
Project #1 (funded by NSF): Bridging the Gap Between ABMs of Complex Biological Phenomena and Real-world Data Using Surrogate Models

This project aims to develop a new computational framework for parameter estimation, uncertainty quantification, and sensitivity analysis of multiscale agent-based models (ABMs) informed by noisy, sparse, and multidimensional real-world data. Our approach involves explicitly formulated, mechanistic surrogate models simultaneously inferred from both the ABM formulation and the experimental data, enabling us to link the two in previously impossible ways. By connecting an ABM to real-world data via a data-informed and less complex surrogate model, the mappings between ABM inputs and surrogate model parameters and between surrogate model parameters and real-world data produce estimates of ABM parameter values, including any associated uncertainty. This same approach also provides a means to infer ABM parameter sensitivity from the data. The postdoc's involvement in this research project includes collaborating with a team of mathematicians and computer scientists to develop this method further and test it in several biological settings with various types of multidimensional data.

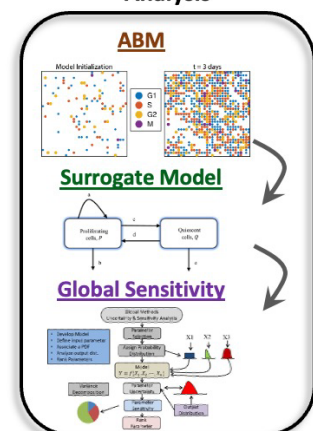
Aim 1: High Dimensional Parameter Space, *Unidimensional* Data



Aim 2: High Dimensional Parameter Space, *Multidimensional* Data



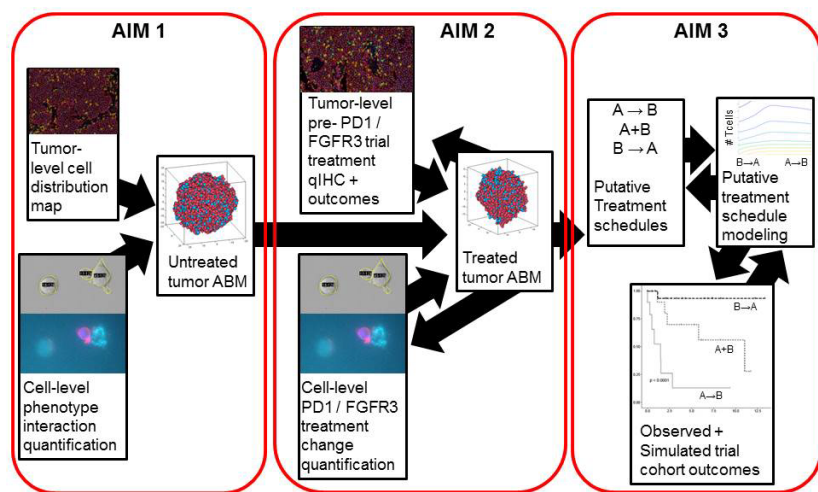
Aim 3: Global Sensitivity Analysis



Project #2 (funded by NIH): Multiscale Computational Models Guided By Emerging Cellular Dynamics Quantification For Predicting Optimum Immune Checkpoint And Targeted Therapy Schedules.

The project aims to further develop, simulate, and analyze multiscale models of combinations of immunotherapy and therapies that target receptors frequently mutated in cancer. These models will be used to predict dose-scheduling regimes that improve therapeutic outcomes while considering physiological variations among tumor and immune landscapes. The postdoc's involvement in this research project includes collaborating with mathematicians and medical oncologists on the synergistic combination of modeling, simulation, and experimentation at the molecular, cellular, and tissue levels. Specifically, the postdoc would further develop and test our multiscale ABM platform by using it to:

- Calibrate and validate our framework for tumor and immune interactions using real-time tumor / T-cell interaction movies,
- Quantify changes in cell-level behavior during immune and mutation-targeted therapies, and
- Predict optimal timing and organization of combination.



For both projects, we seek highly motivated persons with expertise in mathematical modeling of biological and biomedical processes and experience with computational solutions of complex models. A PhD in mathematics, systems biology, or a related field is required.

Ideally, applicants will have extensive experience formulating models of physiological processes, analyzing the models' behaviors including computationally (in Matlab, Python, or a compiled language such as C), carrying out model sensitivity analyses, interpreting the results in biological terms and communicating with applied mathematicians and other quantitative and medical scientists. No prior knowledge of immunotherapy or mutation-targeted therapies is necessary, but a willingness to learn about it is critical.

Both projects are highly collaborative, making effective written and oral communication skills essential. Postdocs working on these projects would become a part of an interdisciplinary, collaborative group of researchers that interact frequently. For a mathematical scientist looking towards a career doing research in mathematical biology, whether in academia or industry, time spent working in these communities will be intellectually enriching and broadening and will provide experience in 'team-based' research.

How to Apply

Application materials should be submitted electronically through the [AMS MathJobs website](#). Alternatively, applications may be sent to: Postdoctoral Hiring Committee, Department of Mathematics, University of Michigan, 2074 East Hall, 530 Church Street, Ann Arbor, MI 48109-1043. Salary is competitive and there are also opportunities for supplemental summer salary. Please provide a placement dossier consisting of a letter of application, curriculum vitae, and three-four letters of recommendation (one of which must address teaching). In all cases, please provide a statement of teaching philosophy and experience, evidence of teaching excellence, and a statement of current and future research plans. The University of Michigan is supportive of the needs of dual career couples and is an equal opportunity/affirmative action employer. The University is committed to diversity, equity, and inclusion, and we encourage applications from candidates who will contribute to furthering these goals. Please email math-actf@umich.edu with any questions about the application process and Professor Trachette Jackson, tjacks@umich.edu, for further information about the research projects.