LAUREN MELCHER

456 Clay Road, Apt C, Rochester, NY 14623
214-727-4435 ⋄ lem3067@rit.edu

EDUCATION

PhD in Mathematical Modeling *Aug. 2018 - Present*
Rochester Institute of Technology

B.S. in Mathematics w/ minor in Computer Science *Aug. 2014 - May 2018*
Texas A&M University-Commerce

TECHNICAL STRENGTHS

Computing skills C/C++, R
Software MATLAB, Linux/Unix, LaTeX, Excel, Mathematica, AutoCAD, yEd

PROJECTS

Investigating Dynamic Stiffening and Softening in Colloidal Network Aug. 2019-present
Rochester Institute of Technology

- Investigating colloidal network as a model system that can dynamically switch between crosslinked and unlinked states when connected via crosslinkers.
- Using Brownian Dynamics simulations and analyzing properties, such as the degree of order in the system, connected clusters size, and the mechanical rigidity of the system as a function of time for different volume fractions of colloids and crosslinking kinetics.
- Our results can provide insights into the design of self-sustaining soft materials that can autonomously transition between solid-like and fluid-like states, and how the properties of such materials can be tuned.

Modeling Cytokine Kinetics in COPD Patients Jun.-Aug. 2019
Rochester Regional Hospital

- Used Elsevier Knowledge Graph database to build known interactions reported to linking cytokines.
- Encoded set of ordinary differential equations characterizing concentration patterns of main cytokines.
- System parameters were estimated using partial least squares (PLS) to mitigate instability on coefficient values that resulted from collinearity between regressor variables.
- Results showed IL6 separates infrequent and frequent episodes well based on frequent episodes and cytokines IL2, IL7, and MCP1 separate patient exacerbation levels within infrequent episodes.

Developing Set of Error-Correcting Codes Sept. 2016 - Dec. 2017
Texas A&M University-Commerce

- Constructed punctured generalized codes and defined parameters and the complete weight distribution using Magma software
- Derived a set of Reed-Muller codes from our set of punctured codes
- Presented findings at MAA Texas meeting and successfully defended thesis in Fall 2017
- Results were accepted and published in peer-reviewed mathematics journals
- Project funded by **FREP** grant

Simulating Evolutionary Effects of Clonal Interference May 2017 - Aug. 2017
University of Kansas

- Developed extended simulation model of clonal interference with varying mutational effects in C code
- For small populations, the simulation model demonstrated effects of Muller's Ratchet in population fitness levels
- Presented findings at the summer research symposium
- Internship funded by **NSF**

PUBLICATIONS

"On generalized MacDonald codes", Padmapani Seneviratne and Lauren Melcher, *Involve, a Journal of Mathematics*, Apr. 12 2018.

"Binary and ternary LCD codes from projective spaces", Padmapani Seneviratne and Lauren Melcher, *Discrete Mathematics, Algorithms and Applications*, Sept.28 2018

EMPLOYMENT

Workshop Instructor Aug. 2019 - Dec. 2019
Rochester Institute of Technology

- Conducted hourly workshop sessions for Calculus I
- Produced and distributed workshop handouts and problem sets for students
- Held weekly office hours for students and managed students' course progress and inputted grades

Teaching Assistant Aug. 2018 - Present
Rochester Institute of Technology

- Assisted in leading Calculus I workshops and facilitating discussion among student groups
- Collected and graded weekly homework problem sets
- Tutored and reviewed class material with students during office hours

Teaching Assistant Jan. 2018 - May 2018
Texas A&M University-Commerce

- Audited lectures for a freshman signature course in Voting and Apportionment
- Held weekly discussion sessions outside of lecture and helped students complete problem sets
- Administered weekly quizzes and assisted lead professor with grading duties