

Mathematical Biology Seminar
Wednesday, February 2, 2022
Speaker: Dr. Daniel A. Cruz,
Visiting Assistant Professor, Georgia Institute of Technology



Title: Agent-based modeling of emergent patterning within stem cell colonies

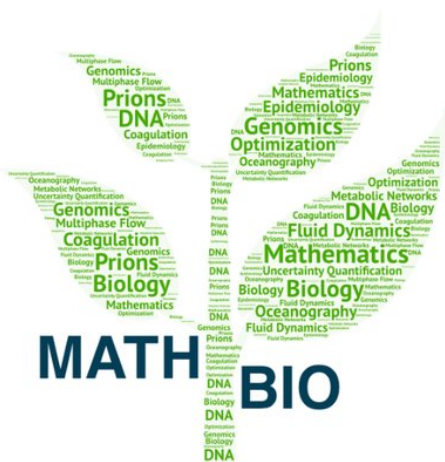
Time: 11am

Zoom Link:

<https://ucmerced.zoom.us/j/98050375649>

Passcode: 172069

Abstract: The differentiation of stem cell colonies into specified tissue types is possible through local and long-distance intercellular communication; however, it is unclear which mechanisms take priority in context-specific situations. Here we consider human induced pluripotent stem cells (hiPSCs) whose therapeutic potential arises from their ability to differentiate into all germ layers: endoderm, mesoderm, and ectoderm. Informed by experimental data, we develop a collection of Boolean network models for the FGF/ERK pathway which serves as a means for intercellular communication. The purpose of these models is (i) to study the role of FGF signaling in the context of hiPSC differentiation and (ii) to inform a type of multi-scale model called an agent-based model (ABM) that incorporates additional biological details like cell location. We also extend an existing mathematical framework which formalizes ABMs to estimate long-term model behavior with respect to time. In this way, we aim to both the local dynamics of intercellular communication and the emergent behaviors of our ABM to ascertain which mechanisms determine cell fate in this context.



Organized by:

Suzanne S. Sindi ssindi@ucmerced.edu &

Erica Rutter erutter2@ucmerced.edu

Register for Credit with CRN: 16017

Full Seminar Schedule:

<https://appliedmath.ucmerced.edu/node/52>

Join our Mailing List: <https://bit.ly/2LqjnT6>

To Join our Slack Email Organizers