

Open Source Tools for Biological Circuit Design Tools
BE 240 - Spring 2020
Course Syllabus

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Learning objectives:

- Develop working knowledge of modeling, simulation, and design tools that are available for biological circuits and apply that knowledge to a circuit relevant to your research
- Gain insights into modeling and design choices, including what level of detail to include in a model based on the questions you are trying to ask
- Expand the available applications of model-based design of biological circuits and/or the available tools for biological circuit design through open source implementations

Pre-requisites: BE 150b (biological circuit design), BE 103/203 (or familiarity with Python)

List of topics to be covered (in rough order)

Date	Topic	Lecturer	Tools
W1 - 30 Mar	Organizational week	Richard	Anaconda, Jupyter, Git
W2 - 6 Apr	CRNs and simulating them with Bioscrape	William	Bioscrape
W3 - 13 Apr	Model reduction in bioscrape via non-mass-action propensities and rules	Ayush	Bioscrape
W4 - 20 Apr	BioCRNpyler for generating large CRN models from parts	William	BioCRNpyler
W5 - 27 Apr	Compartments as orthogonal CRNs connected by diffusion reactions and SubSBML	Ayush	SubSBML
W6 - 4 May	Spatial systems and signalling	Cindy	Gro
W7 - 11 May	Cells and Growth/death regulation	Cindy	Gro
W8 - 18 May	System ID: Bioscrape inference tools (Ayush and William?)	Ayush, William	Bioscrape
W9 - 25 May	Bioscrape Lineages as a well-mixed version of GRO (William)	William	Bioscrape Lineages
W10 - 1 Jun	Advanced: Automated Model Reduction (Ayush)	Ayush	TBD