

# W1-Note

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2023-08-08

## Dynamic Modelling Methods for System Biology

### Syllabus:

1. Introduction to MATLAB
2. Dynamical systems
3. Bistability in biochemical signaling
4. Bistability in biochemical signaling; modeling the cell cycle
5. Modeling the cell cycle; modeling electrical signaling
6. Modeling electrical signaling
7. Modeling the spatial dependence of signaling
8. Stochastic modeling

## W1. Computing with MATLAB

### Different categories of mathematical models:

1. Statistical
2. Top down:
  1. Process:
    1. Start with (large) dataset
    2. Find patterns by statistical methods
    3. Predictions based on structure
  2. Applications: Network analysis ; Gene set enrichment ; Clustering ; Principal components ; Partial least-squares regression
3. Bottom Up
  1. Process
    1. Start with hypothesis of biological mechanism
    2. Write components interaction equations
    3. Simulations to predict
  2. Applications:  
ODE ; Dynamic Systems ; Parameter estimation ; PDE ; Stochastic models

### Structure of dynamical modelling study

- Mechanism
- Equations
- Program to simulate equator:

- Simulations
- Analyze output

## Structure of a dynamical modeling study

