

# Modeling and Simulation in Systems Biology

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Systems Biology is a rapidly growing field that seeks to integrate biological data to understand how biological systems function. By studying the relationships and interactions between various parts of a biological system it is hoped that an understandable model of the whole system can be developed. An important but subtle aspect of systems biology is the iterative process to construct the model, determine the parameters, run the simulation, compare simulation results with experimental data and improve the model. This course will introduce students to the up-to-date modeling and simulation techniques through the latest research in topics such as genetic switch, cell cycle, circadian rhythm and signal transduction. Special attention will be paid on the stochastic effects in gene networks and the recent progress on stochastic simulation algorithms.

In the first several weeks the instructor will give an overview introduction on researches and applications related to modeling and simulation in systems biology. Then groups of students with different backgrounds will give lectures and presentations from the current literature. Graduate students in computer science, mathematics, statistics, chemical engineering and life sciences are strongly encouraged to take this course. Undergraduates are welcome with permission from the instructor.