

ICSB 2010 Tutorial: Systems Biology Workbench

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This tutorial aims to familiarize participants with the tools provided in the Systems Biology Workbench for building and analyzing deterministic and stochastic models. Using SBW and integrated 3rd party software, we will introduce modeling, time course and steady state concepts, parameter sensitivity (MCA) and bifurcation analysis.

The Systems Biology Workbench (SBW) is an extendable, open source software framework, connecting software applications written in a variety of programming languages. Software components provided with SBW assist in analyzing, creating, optimizing, simulating and visualizing computational models.

Tutorial Outline (tutorial length is approximately 4 hours):

1. Welcome and Set / Up (15 minutes)
2. Introduction to the Systems Biology Workbench (15 minutes)
 - a. The framework
 - b. The modules
3. Modeling (40 minutes)
 - a. Brief Introduction to modeling
 - b. Continuous vs. stochastic modeling
 - c. Script based modeling using *Jarnac* / *JarnacLite*
 - d. Modeling in the visual environment *JDesigner* / *BenZaiTen*
 - e. Annotating models with MIRIAM / SBO terms
4. Simulation / Visualization (15 minutes)
 - a. Time course analysis
 - b. Steady state analysis
5. Break (20 minutes)
6. Hands-on Exercises (25 minutes) – Homeostasis, feed-forward networks and MCA
7. Analysis (20 minutes)
 - a. Hands-on Exercises – Feedback Oscillators
 - b. Bifurcation Analysis using the *Bifurcation Discovery Tool* and *Oscill8*
 - c. Frequency Analysis
8. Break (20 minutes)
9. Stochastic simulation and analysis (15 minutes)
 - a. Stochastic focusing, cell fate decisions and stochastic switching
 - b. Approaches to analyzing stochastic simulation data.
10. Hands-on Exercises (25 minutes) – Stochastic reaction networks
11. Discussion (25 minutes)
 - a. Future Directions and Q & A

The target audience for this introductory tutorial will be research scientists and students interested in modeling as well as simulation and analysis of computational models. Participation in the tutorial does not require prior experience in modeling/simulation or skills in computer programming. Tutorial material along with a software release will be made available on <http://sys-bio.org>.

If you require further information, please do not hesitate to contact Frank Bergmann at fbergman@u.washington.edu.