
Systems Biology II: Simulation of Dynamic Network States

BIOINF 4394 (6 ECTS credits)

Overview

This class teaches how methods from mathematical modeling can be applied to biological systems. This includes creating models of biochemical reaction networks, simulation and analysis of their dynamic responses as well as fundamental programming techniques for solving problems of systems biology. Participation in Systems Biology I is **not** a prerequisite for this class.

Goals

- Introduction to the fundamental concepts of biological networks
- Knowledge about biophysical and biochemical constraints and implicit assumptions, principles of enzyme catalysis, open and closed systems, effects of reversible reactions on the overall system as well as multiple time scales.
- Practical experience in deriving kinetic equations and the dynamic simulation of systems biology models as well as subsequent analysis

Requirements

- Weekly participation within the tutorial
- Joint completion of a small project, documentation as scientific essay, and presentation of the project.

Evaluation

- Assignments will have to be submitted in small groups of up to three students and be individually presented. Instructors will check for duplicate solutions and reserve the right to distribute points across all identical solutions.
- Students caught copying solutions can be excluded from the course!
- Work on projects will be in teams of 2-3 students.
- 50% of the achievable points in both assignments and project are required for passing and participation in the final exam. Points achieved in excess of 60% in assignments and projects will be added as bonus points to the final exam. Bonus points will improve the final exam grade up to 15% of the regular points in the final exam.
- The final exam will be a written test.

Winter Semester 2017/18
Wednesday 14-16 Room A301 and
Tuesday 8-10 Room C215, Sand 14

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Materials

Slides and complementary material will be made available at the ILIAS page about this class.

Recommended literature:

- Palsson. Systems Biology: Simulation of Dynamic Network States. Cambridge University Press, 2011.
- Goodsell. The Machinery of Life. 2nd edition, Springer-Verlag, 2009.
- Koolman & Roehm. Color Atlas of Biochemistry. 2nd edition. Thieme-Verlag, 2005.

Milestones

October 18th 2017

First lecture

October 24th 2017

First homework assignment due

December 19th 2017

Begin of project work

January 30th 2018

Submission of projects

February 6th 2018

Presentation of projects

February 22nd 2018

Final exam
