Proseminar: Selected Topics in Systems Biology
BIOINF 3372 (3 ECTS credit)

Winter Semester 2019
Tuesday 8-10 in Room A104, Sand 14

Instructor:
Dr. Reihaneh Mostolizadeh
E-Mail: mostoli@informatik.uni-tuebingen.de
Phone: +49-7071-29-70460
Office: C321, Sand 14
Office Hours: Monday 12-14

Overview

This proseminar will give students a broad overview of computational systems biology in general. Systems biology is a collaborative to integrate many scientific disciplines to predict how these systems change over time and under varying conditions. Selected topics will introduce modeling techniques, including constraint-based modeling, kinetic modeling, Gillespie's algorithm, sampling methods, and applications in biotechnology as well as to healthcare. Students will present and discuss recent publications in combination with fundamentals of the underlying theories and algorithms. Through discussions of published papers, students will learn how to employ computational modeling as a tool and perform experimental data to feeding the models.

Goals

- Learning fundamental concepts in the biological network modeling for an integrative approach to the study of living systems.
- Gaining skills to understand the concepts of mathematical or computational models of biological systems and their analysis in the context of laboratory data sets.
- Familiarization with essential computer tools for constructing the models.
- Understanding the terminology in systems biology research papers.

Requirements

- The main focus is on mathematical approaches in modeling instead of algorithms and theories in biology. Those ones who fascinate in connecting mathematics and biology are welcome.
- Appropriate presentation of published papers by students
- Strong cooperation of students and documentation of new learned aspects through students presentation

Evaluation

The grading will be a mixture out of:

- 45% for the talk
- 45% for the written document
- 10% for participation in discussion

Materials

All talks will be scheduled during the first meeting and published via ILIAS. Recommended literature:

- Sauro, Herbert M. *Systems Biology: Introduction to Pathway Modeling*. Ambrosius Publishing, 2018.
- Heinrich, Reinhart, and Stefan Schuster. *The regulation of cellular systems*. Springer Science & Business Media, 2012.
- Mostolizadeh, Dräger & Jamshidi. *Insights into Dynamic Network States using Metabolomics Data*. In: Angelo D'Alessandro (eds) High-Throughput Metabolomics. Methods in Molecular Biology, 2019.
- Palsson. *Systems Biology: Properties of Reconstructed Networks*. Cambridge University Press, 2007.
- Palsson. *Systems Biology: Constraint-based Reconstruction and Analysis*. Cam Univ. Press, 2015.
- More references will be introduced in the proseminar

Milestones

October 15th 2019

Introduction

November 12th 2019

First presentation by students

February 4th 2020

Last presentation