# Systems Biology I: Properties of Reconstructed Networks
## BIOINF 3371 (6 ECTS credits)

## Overview

Genome sequences are now available that enable us to determine the biological components that make up a cell or an organism. Systems biology examines how these components interact and form networks and how the networks generate whole cell functions corresponding to observable phenotypes. This lecture is an introduction to basic concepts of systems biology devoted to undergraduate students. It describes how to model networks, how to determine their properties, and how to relate these to phenotypic functions.

## Goals

- Introduction to the fundamental concepts of biological networks, such as metabolic networks, transcriptional regulatory networks, and signaling networks
- Knowledge about the basic structure of systems biological models, biophysical and biochemical boundary conditions and implicit assumptions
- Practical experience in creating and analyzing system biology models.

## Requirements

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

## Evaluation

- Assignments can be submitted in teams of up to three students. Every team member must be able to demonstrate the results.
- 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 two to three students.
- 50% of the achievable points in both assignments and project are required for 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 and will improve the final grade up to 30%.
- The final exam will be a written test.

## Materials

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

- Palsson. Systems Biology: Properties of Reconstructed Networks. Cambridge University Press, 2007.
- Palsson. Systems Biology: Constraint-based Reconstruction and Analysis. Cam Univ. Press, 2015.
- Goodsell. The Machinery of Life. 2nd edition, Springer-Verlag, 2009.
- Koolman & Roehm. Color Atlas of Biochemistry. Thieme, 2005.

## Milestones

**April 20th 2017**

First lecture

**May 4th 2017**

First homework assignment due

**May 29th 2017**

Begin of project work

**July 13th 2017**

Submission of projects

**July 20th 2017**

Presentation of projects

**August 3rd 2017**

Final exam