

SYSTEMS BIOLOGY

RESEARCH CENTRE AT UNIVERSITY OF SKÖVDE

RESEARCH AREAS

Ecological and evolutionary networks

- The spread of animal infectious diseases in animal farm networks
- Swedish animal transport systems and animal welfare
- Artificial neural networks in the study of evolution
- Trophic networks: Understanding the decline of Arctic char in Lake Vättern
- Tools for assessing the robustness of ecological networks to biodiversity change

Immunology and microbiology

- Modelling T helper cell activation and development
- Parameter estimation in Ulcerative colitic mouse models
- Modelling the formation of microbial biofilms
- Network modeling of pneumococcal transmission
- Characterizing the dynamics of systems in *Staphylococcus aureus*

Tumor genomics

- Large-scale methods for identification of cancer specific genetic alterations
- eQTL analysis of cancer susceptibility
- Deriving oncogenetic tree models of tumor evolution
- Use of miRNAs as diagnostic and prognostic markers for cancer
- Combined signatures for cancer prognosis

Bioinformatics

- Human embryonic stem cells differentiation
- Developing methods for large-scale network analysis
- Cold acclimation in plants
- Semantic pathway comparison algorithms for systems biology

Physiology, Pharmacology and Toxicology

- Studying factors involved in coordinating and maintaining cells, organs or organisms in homeostasis
- Studying biological processes related to physiology, pharmacology or toxicology
- Characterizing the use of different substances and their medical and toxicological influence in humans in a multi-ethnic perspective
- Characterizing pathological conditions at different levels, aiming at the development of new treatments
- Biotechnology research with focus on plants

Miscellaneous

- Information fusion in precision agriculture for real-time nitrogen application
- Ecology of freshwater mussels and their suitability as bioindicators for detecting harmful chemicals in freshwater ecosystems.
- Release patterns of hormones of well-being and stress

EDUCATION IN SYSTEMS BIOLOGY

Example courses, basic level

- Systems biology – Introduction
- Systems biology – Applications in medicine

Example courses, advanced level

- Systems biology – History
- Systems biology – Formulation of Mathematical Models
- Systems biology – Parameter Estimation from Data

- Systems biology – Enzyme Kinetics
- Systems biology – Population Dynamics
- Systems biology – Modelling Intracellular Networks

- Research in Systems Biology and Critical Reading
- Research in Systems Biology and Scientific Writing

These advanced courses are 1.5 ECTS credits each, and are suitable to combine in different modules.

