

Master's Theses

Applied Computational Genomics Team

Topics	We offer topics in Applied Computational Genomics. The specific questions can be defined based on the individual background and interests.
Track	Genome-oriented ACLS
Key words	Genomics, Forensics, Pathogen Dynamics, Species and Gene Evolution, Human Disease Genomics, Semantic Web and Ontologies for the Life-Sciences Mathematical Modeling, Data Analysis, Programming, Algorithm Design, Computational Statistics, Predictive Analytics
Supervisors	Dr. Maria Anisimova, Dr. Manuel Gil
Co-Supervisor	Depending on the project, members of the ACGT or external collaborators
External partners	Our current partners are Roche, IBM, Uni Zurich, ETH Zurich, Swiss Institute of Bioinformatics
Place of work	Wädenswil

Current Areas **Predicting seasonal dynamics of influenza**

Human influenza strikes annually throughout the world, with epidemics peaking in the cold winter months. We analyze genomic flu samples from infected patients in order to disentangle the relative roles of epidemic dynamics, viral evolution, and climatic drivers in flu outbreaks. Such research facilitates the development of seasonal influenza vaccines.

Phylogenetics and modeling molecular evolution

Evolutionary thinking helps to disentangle underlying biological mechanisms shaping genomic data. Genomic sequences of common origin are routinely used to infer phylogenies (evolutionary trees), which provide test-bases for biological hypotheses or support downstream analyses. We work on methods for phylogenetic inferences from genomic data.

Data handling and representation in Bioinformatics

Topics include the graphical representation, the interactive search and discovery, the simultaneous mining, and the semantic integration of sources of data.

Other projects in Bioinformatics or Genomics

We are eager to develop algorithms for the analysis of antibody sequences in order to improve in-silico antibody design; genome-wide surveys of clinical samples for medical applications; or predicting the molecular basis of pathogenicity and resistance, for instance, to improve crop yields and plant resistance properties. Working on algorithms for the analysis of environmental samples or for forensics are other exciting possibilities.

Requirements We can accommodate students with different skills and design projects to adapt to the competence level of the student. Furthermore, students can acquire missing competences in the track tutorials and by self-study.

Desired competences (present or to be acquired) include programming skills, knowledge of mathematics and statistics, and an interest or background in the life-sciences relevant for the topic

Comments The ACGT is a member of Swiss Institute of Bioinformatics (SIB) so that Master students are entitled to enjoy training opportunities at SIB.

Contact Maria Anisimova, maria.anisimova@zhaw.ch
Manuel Gil, manuel.gil@zhaw.ch