

## Advanced Block Course: Computational Biology, 3 ECTS (January 2020)

### Dates and location:

The course will take place **January 13 – January 24, 2020**, 9:15 – 12:00 & 13:00 – 16:00

ETH Central Campus Zurich, ROOM:

- January 13 – 17: HG D 5.1
- January 20 – 24: CHN F 42

### Course overview

	Mon 13	Tue 14	Wed 15	Thu 16	Fri 17
<b>Morning</b>	Introduction, course overview (JS) Introduction to case studies (JS, all)	<i>Case Studies</i>	Modeling: Spatial Models (DI)	Computational Interpretation of large-scale Tn-Seq-Datasets (BC)	Modeling: Probabilistic Graphical Models (NB)
<b>After-noon</b>	<i>Case Studies</i>	Introduction Small RNA (CC)	Large data sets: Transcriptomics and Proteomics (KB)	<i>Case Studies</i>	<i>Case Studies</i>

  

	Mon 20	Tue 21	Wed 22	Thu 23	Fri 24
<b>Morning</b>	Image-based functional drug profiling (BS)	Metagenomics (SS)	TBD (BT)	TBD (YB)	<i>Case Studies</i>
<b>After-noon</b>	Databases (CvM – Abdullah Kahraman)	<i>Case Studies</i>	Modeling: Structural Network Analysis (JS)	<i>Case Studies</i>	Presentation of case studies (JS, US, all)

**Lecturers:** Katja Bärenfaller (KB), Niko Beerenwinkel (NB), Yaakov Benenson (YB), Beat Christen (BC), Constance Ciaudo (CC), Dagmar Iber (DI), Abdullah Kahraman, Uwe Sauer (US), Berend Snijder (BS), Joerg Stelling (JS), Shinichi Sunagawa (SS), Barbara Treutlein (BT), Christian von Mering (CvM),

### Prerequisites

The course content builds on the "Introduction Course: Systems Approaches in Biology" and on general background related to computational biology. Background knowledge will be important in the areas of probability and statistics, linear algebra, calculus, dynamic systems (ODEs / PDEs), and basic programming skills.

The course lectures are complemented by team work on case studies based on the participants' own PhD projects.

### **Case studies**

Team work on case studies will be a central element of the course. All participants are requested to submit a short description of a computational biology problem in the context of their own PhD project that could be selected for a case study.

A case study description should be no longer than 2 pages and contain the following information:

- Problem description (a sufficiently specific scientific question to start addressing it during the course, related, e.g., to the modeling and analysis of a detailed aspect of your biological problem),
- State of the art (context of the problem with biological or methodological background),
- Relevant data (short characterization of the type of data sets available),
- References (1-2 key papers, preferably a review in addition).

### **Registration**

Students in the "Systems Biology" and "MTB/Biomedicine" program, please register by December 13, 2019

<https://ethz.doodle.com/poll/awa425dmnqcidhc7>

In case of free places, students in other programs of the LZSGS may be accepted; please indicate your interest by email as well.

Case study descriptions need to be submitted by **January 3, 2020** by e-mail to sysbio-phd@bsse.ethz.ch

### **Materials**

Please bring your own laptop with a current version of Matlab installed (e.g., via IDES)

### **Suggested reading:**

Uri Alon, An Introduction to Systems Biology, Chapman & Hall, 2006  
Edda Klipp et al., Systems Biology in Practice, Wiley-VCH, 2005.  
Anthony Davison, Statistical Models, Cambridge University Press, 2003.