Logical modeling for experimental design in current and future biotechnology and biomedicine

Location

Norwegian University of Science and Technology (NTNU), Trondheim

Dates

20 August 2018 – 31 August 2018

Application deadline: 23 July 2018

Course content

The course builds on approaches and technologies that we are currently developing in the NTNU DrugLogics initiative (www.druglogics.eu), where we use the logical modelling formalism for predicting the outcome of chemical perturbations (cancer drugs) on cancer cell fate decisions. This approach combines knowledge management, logical model construction and computational simulation with experimental assays and hypothesis testing for pre-clinical (biotechnological) drug development and clinical decision support. The course will exemplify how such approaches can be used in both the biotechnological and biomedical sectors such as pre-clinical drug discovery and repurposing, and clinical development of diagnosis and (combinatorial) treatment of cancer.

The course content will focus on:

- theoretical principles as well as existing tools and resources for logical modeling
- resources and tools for knowledge management to underpin logical modeling
- computational biology assisted reasoning for (large scale) hypothesis management by using logical modeling
- (large scale) hypothesis management for interpretation of biotechnology-/biomedicine experimental data and for design of new experiments
- fundamental challenges in future biotechnology and biomedicine that require logical modeling for adequate hypothesis management
- discussion of trajectories for development of modeling-based research infrastructures for future biotechnology and biomedicine including reflections on implications of each of the trajectories for users and stakeholders of these infrastructures

Teaching and course material

The course will start August 20 and end August 31. We will provide a weblink to relevant literature and web resources that students should read before the course.

The course will consist of 12 lectures and 50 hours of team/project-based learning: Student exercises and project-based learning in multidisciplinary teams applying tools and resources for modeling-based hypothesis generation and management.

Day 1: Introductory lectures, introduction to responsible research and innovation and team-based learning-sessions
Day 2-5: Combination of lectures/TBL and supervised student group work with tools and resources
Day 6-8: Project-work: develop and characterise logical models, and their implications for knowledge discovery
Day 9, 10: Project writing, presentations.

The students will use an eNotebook for the project and reporting. Each student will submit an individual report, on which they will be assessed.

The language of lectures and instructions is English.

Teachers include:

Martin Kuiper, Professor Systems Biology, IBI, NTNU
Denis Thieffry, Professor Systems Biology, Department of Biology, IBENS, Paris, France, and Guest Researcher at the Systems Biology group of IBI, NTNU.
Astrid Lægreid, Professor Functional Genomics, IKOM, NTNU
Rune Nydal, Ass. Professor ethics of technology, IFR, NTNU
Åsmund Flobak, postdoc in Astrid Lægreid's Functional Genomics group, NTNU
Aurélien Naldi, postdoc in Denis Thieffry's computational systems biology team, IBENS
Some additional guest lecturers will participate.

Application procedure

Applications, including a motivation letter and a CV should be sent by email to kuiper@ntnu.no.
There is a maximum of 25 students, deadline for application is **July 23**. Students should have an MSc either in biotechnology, biology, biomedicine, computational biology or bioethics.

Further information
For questions about the course, contact Martin Kuiper: kuiper@ntnu.no.
Questions related to travel grants from Digital Life Norway Research School should be directed towards Liv Eggset Falkenberg: liv.falkenberg@ntnu.no.