

# Workshop on Modelling in Biology and Medicine, 1.5 hp

**Course period:**

May 9-10, 2019

**Last day for application:**

April 25, 2019

**Course leader / Address for applications:**

Marija Cvijovic/ <https://mbm.systemsbiology.se/>

**Course description (Advertisement for Ph.D. students):**

Successful integration of mathematical methods, biology and medicine represents one of the key factors for a deeper understanding of biological phenomena and complex diseases. The partnership between academia and industry is essential for developing cutting-edge approaches and tools that will bridge the gap between experimental data and medical knowledge thus move us from ‘guess and pray’ to ‘predict and test’ method. This course offers a unique opportunity to learn how the latest techniques developed in the field are bringing us to step closer to the medical application and what are the potential bottlenecks that are preventing us to fully exploit research developed within academia and apply it in industry. Also, students will have an opportunity to present their own research, either as a poster or an oral. By giving successful examples from both industry and academia students will be introduced to the broad range of methods and applications, including the development of new therapeutics. The course will include a number of visiting lectures both local and from abroad and experts in the field from the industry located in Göteborg Area. This will give the opportunity for networking and exploring possibilities for the career outside academia. Lecturers will dedicate time to share their experiences and discuss and explore various career paths available for freshly baked PhDs.

The course will be held May 9-10, 2019 (two full days)

**Responsible department and other participation departments/organisations:**

Mathematics Department

**Teacher:**

Several invited lecturers: Matteo Barberis, Francesco Gatto, Peter Gennemark, Adil Mardinoglu, Marina Rafajlovic

**Examiner:**

Marija Cvijovic

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## 1. Confirmation

The syllabus was confirmed by the Head of the Department of XXX 200X-XX-XX, 200X-XX-XX.

Disciplinary domain: Science

Department in charge: Department of Mathematical Sciences

Main field of study: Mathematics

## 2. Position in the educational system

Elective course; third-cycle education

## 3. Entry requirements

Interest in mathematical modelling and biology

## 4. Course content

Topics to be covered during the course are: Systems Medicine, Personalized Medicine, Pharmacokinetics/Pharmacodynamics (PK/PD), Rule-based modelling, Boolean modelling, Machine learning/Deep learning, Network modelling

## 5. Outcomes

*Knowledge and understanding* At the end of the course, the students will have acquired knowledge about some of the main results and techniques of mathematical modelling

*Skills and ability*

- Ability to effectively communicate between disciplines
- Ability to identify appropriate modelling method based on a given biological problem
- Skills to effectively communicate project results and how these meet the project objectives in an oral form
- Skills to build and expand both horizontal and vertical network

*Judgement and approach*

Critically evaluate and judge the use of the mathematical model and its ability to reproduce experimental data and predict new behaviour presented in primary research articles and scientific reports

## 6. Required reading

This is a hands-on course, thus no course literature is required.

## 7. Assessment

The examination consists of an oral or poster presentation.

A Ph.D. student who has failed a test twice has the right to change examiners, if it is possible.

A written application should be sent to the Department.

In cases where a course has been discontinued or major changes have been made a Ph.D. should be guaranteed at least three examination occasions (including the ordinary examination occasion) during a time of at least one year from the last time the course was given.

### **8. Grading scale**

The grading scale comprises Fail, (U), Pass (G)

### **9. Course Evaluation**

The course evaluation is carried out together with the Ph.D. students at the end of the course, and is followed by an individual, anonymous survey. The results and possible changes in the course will be shared with the students who participated in the evaluation and to those who are beginning the course.

### **10. Language of instruction**

The language of instruction is English.