Mathematical biology, 7.5 hp

Course period:
March 25 - May 31, 2019

Last day for application:
March 25, 2019

Course leader / Address for applications:
Philip Gerlee / gerlee@chalmers.se

Course description (Advertisement for Ph.D. students):
Mathematical biology is a wide subject area ranging from theoretical ecology, population dynamics and evolutionary dynamics to physiology, morphogenesis and reaction kinetics. The mathematical tools involved span ordinary and partial differential equations, difference equations, stochastic processes and individual-based models. This course will give an introduction to these topics simultaneously present how mathematical techniques can be used for understanding and interpreting biological phenomena. We will consider both simpler models that are analytically tractable and more complicated ones that are explored using simulations and other numerical techniques.

The course will start at the end of March and run twice a week until the end of May (LP4). The schedule will be decided by participants at an introductory meeting.

Responsible department and other participation departments/organisations:
Mathematics Department

Teacher:
Philip Gerlee

Examiner:
Philip Gerlee

Mathematical biology, 7.5 hp

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
Ordinary differential equations, partial differential equations, programming

4. Course content
The course will cover a suitable subset of the following topics. The final curriculum will be decided upon during the course.

- Populations dynamics & intra-cellular kinetics
- Evolutionary game theory
- Adaptive dynamics
- Pattern formation

5. Outcomes
At the end of the course, the students will have acquired knowledge about some of the main results and techniques of mathematical biology.

6. Required reading
Excerpts from the following books will be used in the course:

- A short history of mathematical population dynamics, Nicolas Bacaër
- Evolutionary games and population dynamics, Josef Hofbauer & Karl Sigmund
- Mathematical Models in Biology, Leah Edelstein-Keshet
- Mathematical methods to gain biological insight, Odo Diekmann & Bob Planqué

7. Assessment
The examination consists of homework sheets, presentations and an oral exam at the end of the course.

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.