Linnæus University

Jnr: 2018/2844-3.1.2.2

Course syllabus

Faculty of Technology
Department of Computer Science and Media Technology

4DV650 Modellering och simulering av system, 5 högskolepoäng
Systems modeling and simulation, 5 credits

Main field of study
Computer Science

Subject Group
Informatics/Computer and Systems Sciences

Level of classification
Second Level

Progression
A1N

Date of Ratification
Approved by Faculty of Technology 2018-10-08
The course syllabus is valid from autumn semester 2019

Prerequisites
90 credits in Computer Science (including a degree project at Bachelor level).

Objectives

After completing the course the student shall be able to:

- explain fundamental concepts within modeling and simulation
- describe different classes of simulations, e.g., event-based, and when these should be applied
- implement simple simulations from selected classes, such as event-based, continuous, and agent based
- implement suitable deterministic and non-deterministic models in a tool used to simulate systems
- given a problem, determine a suitable simulation method
- reflect on the suitability of different models for different types of problems as well as which consequences an unsuitable model might have
- value the result of a simulation, e.g., with respect to performance or reliability
- reflect on the importance of being able to simulate system before they are constructed and which benefits that might have for society.

Content

The course gives an overview of different deterministic and non-deterministic modeling and simulation techniques.
The following topics are covered:

- Introduction to modeling and simulation

- How are models and simulations used
- Event-driven simulation
- Continuous simulation
- Queuing theory
- Agent-based modeling and simulation
- Non-deterministic and stochastic modeling and simulation
- Sampling methods
- Monte Carlo-simulation
- Validation of simulations, hypothesis testing, and rare events
- Tools and frameworks for modeling and simulation, e.g., Simulink and Modelica

Type of Instruction

The instruction consists of lectures, seminars, and teacher-supervised laboratory sessions. The course also contains a series of guest lectures where representatives from industry and research discusses how and why they use simulations in their work.

Examination

The course is assessed with the grades A, B, C, D, E, Fx or F.
The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

Assessment of student performance is made through programming assignments and a take-home exam. Students who do not pass the regular examination will be offered retrials close to the regular examination.

To pass the course, grade E or higher is required for all parts. The final grade is decided from: take-home exam (50%) and programming assignments (50%).

Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed.

Other

Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

The course is conducted in such a way that the course participants' experiences and knowledge are made visible and developed. This means, for example, that we have an inclusive approach and strive for no one to feel excluded. This can be expressed in different ways in a course, for example by using the gender neutral example.

Required Reading and Additional Study Material

John A. Sokolowski, och Catherine M. Banks., *Principles of Modeling and Simulation : A Multidisciplinary Approach*, Wiley, latest edition. Pages: 153 av 256.

Louis G. Birta och Gilbert Arbez, *Modelling and Simulation: Exploring Dynamic System Behaviour*, Springer, latest edition. Pages: 341 av 433.