



FAH3002 Traffic Simulation Modelling and Applications 7.5 credits

Traffic Simulation Modelling and Applications

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FAH3002 valid from Spring 2019

Grading scale

P, F

Education cycle

Third cycle

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

In this course, students obtain fundamental knowledge on the principles and applications of transport simulations.

Transport simulators are complex computer programs that solve complex model systems. The models describe real transport phenomena, such as traffic flow dynamics in urban networks. They are typically solved through mathematical techniques, in particular stochastic simulation methods. Real transport problems are analyzed with free or commercial software implementations of these models and solvers.

After successful completion of the course, students should be able to

- apply the basic principles of simulation;
- interpret and analyze stochastic simulation results;
- select application-specific models and simulation methods;
- collect and use real data to calibrate and validate transport simulators;
- deploy simulations for scenario analysis, prediction, and optimization;
- account for and discuss strengths and weaknesses of different simulation methods.

Course contents

This is an advanced course on transport simulation. It consists of lectures and exercises.

The lectures teach fundamental concepts of simulation and its application in transport. This comprises: taxonomy of simulation approaches, scientific principles and mathematical simulation framework, input data preparation, computer simulation techniques, analysis of simulation outputs. These lectures provide a solid foundation to understand and use transport simulations. The lectures also treat a selection of more specific topics. This comprises: calibration and validation of simulators, experimental design, on-line simulation, simulation-based optimization. These lectures provide the ability to solve complex, real transport problems with simulation.

The exercises investigate several case studies of increasing realism with an operational traffic simulator. The exercises give students practical experience with a real simulation software.

Specific prerequisites

AH1022 Traffic and Road Engineering, Basic Course, AH2171 Traffic Engineering and Management or equivalent.

Course literature

- S. M. Ross, Simulation, 4th edition, Elsevier, 2006
- A. M. Law and W. David Kelton, Simulation Modeling and Analysis, 4th edition, McGraw Hill, 2006
- R. Dowling, A. Skabardonis, and V. Alexiadis, Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modeling Software, FHWA-HRT-04-040
- R. Roess, E. Prassas, and W. McShane, Traffic Engineering, 3rd edition, Prentice Hall, 2004

- S. Washington, M. Karlaftis, and F. Mannering, *Statistical and Econometric Methods for Transportation Data Analysis*, Chapman & Hall/CRC, 2003
- Selected papers and class notes
- Manuals of traffic simulation software to be used for projects and case studies

Examination

- INL1 - Homework, 3.5 credits, grading scale: P, F
- TEN1 - Exam, 4.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.