

## Course information

### Planning of public transportation and railway traffic, 6 ECTS

#### Aim

The purpose of the course is to give insights in how the planning and operation of public transportation and railway traffic are carried out. The course is focusing on strategic aspects such as transport network planning, timetable construction, rolling stock planning and pricing, but it also includes traffic and delay management. The course is preparatory for research studies. After completing the course, the student shall be able to:

- describe state-of-the-art in research in planning of public transport and railway traffic.
- understand and describe relevant models and methods used to design a new transport network, evaluate this and discuss its strengths and weaknesses
- understand and discuss issues regarding timetable construction and conflict resolution, in particular with respect to railway traffic.
- implement planning methods for solving numerical instances.

#### Organization and course content

The course consists of lectures and seminars, given by several researchers from the field and is organised in three blocks: In the first block we focus on bus network planning: how should we design the transit routes and how will the travel demand split up on alternative routes. An important part is the reading and understanding of methods from the research. Lecture 1 (see the teaching plan below) introduces the text material and put it in a relevant context and Seminar 1 summarizes the experiences.

The second block focuses on railway traffic modelling. The lecture will give an overview of how the advanced optimisation techniques can be used to find feasible timetables that fulfil the requirements of the rail undertakings as good as is possible. In Lab 1 students will extend an existing optimization model to meet these requirements. The work should be described and submitted as Hand-in assignment II. It will be discussed during Seminar 2.

In addition, all students are welcome to attend KAJT's seminar on Wed Nov 25<sup>th</sup>, to give a view of current research in railway capacity. The seminar is in Swedish and participation optional. More information and instructions for the mandatory pre-registration at [KAJT's homepage](#).

Finally, the third block concerns demand-responsive public transport. The area is introduced in Lecture 3 and will be examined via a project, where a model should be implemented. Support and supervision are given in Lab 2, and the project will be presented oral and written at Seminar 3.

Due to the current pandemic, all scheduled sessions will be held online and we will use the conference tool Zoom.

## Course literature and Information flow

The course literature consists of lecture slides, and material that successively will be provided via the course learning platform. Parts of the course may require access to scientific journals, which are available via the university library.

For the information flow in the course, the learn platform *Lisam* is used. Lisam will also be used for submitting assignments.

## Examination

Every student should solve two hand-in assignments individually, each of which will be graded (Fail, 3, 4, 5):

- Hand-in assignment I: *Public transport network modelling*. (Published Wed Nov 4<sup>th</sup>, deadline for submission Mon Nov 16<sup>th</sup>, oral discussion and feedback on Seminar 1, Mon Nov 23<sup>rd</sup>.)
- Hand-in assignment II: *Railway timetable construction*. (Published Fri Nov 13<sup>th</sup>, supervision at Lab 1, Fri Nov 20<sup>th</sup>, deadline for submission Mon Nov 30<sup>th</sup>, oral discussion and feedback on Seminar 2, Mon Dec 7<sup>th</sup>.)

In addition, a project assignment is solved in groups of two or three students; also this is graded (Fail, 3, 4, 5):

- Project assignment: *Demand-responsive public transport*. (Published Fri Nov 27<sup>th</sup>, supervision at Lab 2, Mon Dec 14<sup>th</sup>, oral presentation and report submission on the seminar, Mon Jan 11<sup>th</sup>, 2021.)

Detailed instructions are given together with respective assignment.

The course grade is computed as a weighted sum of the three parts, where every part is equally important. A part which is handed in with delay or has been subject to revision may be given grade 2 for the computation of the course grade. In order not to delay the grade, any possible revisions must be handed in no later than Mon Jan 11<sup>th</sup>, 2020. Thereafter there are two more chances to submit a revision: March 31<sup>st</sup> and August 31<sup>st</sup>. Any revision which has still not been approved at latest September 30<sup>th</sup>, 2021, will not be further considered, and gives the student an unsatisfactory grade. The student must then redo all hand-in assignments and/or the project assignment according the instructions that are given for the 2021 version of the course.

## Contact persons:

- **Course coordinator and examiner.**  
**Contact person Block I (Public transport network modelling).**  
Anders Peterson; Spetsen 7<sup>th</sup> floor, 011 – 36 31 07; [anders.peterson@liu.se](mailto:anders.peterson@liu.se)
- **Contact person Block II (Timetable construction).**  
Tomas Lidén; Spetsen 7<sup>th</sup> floor, 011 – 36 34 13; [tomas.liden@liu.se](mailto:tomas.liden@liu.se)
- **Contact person Block III (Demand-responsive public transport):**  
Carl Henrik Häll; Spetsen 7<sup>th</sup> floor; 011 – 36 34 68; [carl.henrik.hall@liu.se](mailto:carl.henrik.hall@liu.se)

# Teaching plan

We 04/11	8–10	online	Lec. 1: Course introduction and bus traffic planning	Anders Peterson
Fr 13/11	13–15	online	Lec. 2: Railway timetabling	Tomas Lidén
<i>Mo 16/11 Submission of Hand-in assignment I via Lisam.</i>				
Fr 20/11	10–12	online	Lab. 1/Supervision	Tomas Lidén
Mo 23/11	13–17	online	Sem. 1: Oral examination Hand-in assignment I	Anders Peterson
<i>We 25/11 13–17 online KAJT seminar (optional)</i>				
Fr 27/11	13–15	online	Lec 3. Demand-responsive transport	Carl Henrik Häll
<i>Mo 30/11 Submission of Hand-in assignment II via Lisam.</i>				
Mo 07/12	13–17	online	Sem. 2: Oral examination Hand-in assignment II	Tomas Lidén Anders Peterson
Mo 14/12	13–17	online	Lab. 2/Supervision	Carl Henrik Häll
Mo 11/01	13–17	online	Sem. 3: Oral examination Project assignment <i>Submission of project report (print-out) at the seminar.</i>	Carl Henrik Häll Anders Peterson

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## Colours:

- Dark colour = Block I: *Public transport network modelling.*
- Light colour = Block II: *Railway timetabling.*
- No colour = Block III: *Demand-responsive public transport.*