Transportation Engineering & Traffic Analysis
Fall Semester / 2nd Quarter

Course Details

Course Code	ACE 050
Course	Transportation Engineering & Traffic Analysis
Coordinating Unit	Department of Architecture and Civil Engineering
Term	Semester 2, Fall, 2021
Level	Master
Location/s	The course rooms are SB-H3 and SB-H6 Details at https://cloud.timeedit.net/chalmers/web/public/ri1Y77ygZ05ZZ5Q3X56v5Y025Q08x3656g560YQQ.html
Duration and timetable	7 weeks and 10-hours in class activities per week From 1st November 2021 to 17th December 2021 The full timetable of all activities for this course can be accessed from the "syllabus" module of this course in Canvas

Course Description

This is a compulsory 7,5 credits course in Transportation Engineering. The course will cover basic and key knowledge for transportation engineering in terms of planning, traffic modelling, and management. More precisely, the course will contain following parts: transportation planning and its application, traffic flow characteristics and modelling, geometric design and traffic analysis. The overall aim is to introduce the students about the key steps and generally used methods for transport planning, modelling, design and analysis.

This course starts with teaching the classic transport planning procedures and relevant methods/models in each step of the procedure. Applying the knowledge to small cases via tutorials and homework will be taught to enhance understanding about the learned knowledge transport planning process. Then, the course will continue with roadway segment and intersection design for both rural and urban areas, where the students will learn about the specific geometric design elements and apply them to solve real world design problems. Finally, the course will dive into more detailed contents about traffic characteristics and theories geared towards learning about traffic operations, where the students will focus on traffic flow characteristics, fundamental diagram, level-of-services and shock waves. While the majority of the course is highly focused on road transportation, other modes of transportation may be incorporated into the syllabus. The goal of the course is to give students the general overview of transportation discipline, learn concepts of planning, operations, and design, and then proceed with concept implementation and problem solving. The students will learn about the

most relevant challenges that transportation engineers face in modern society via invited lectures as well, and the contemporary tools that can be developed and used to overcome those challenges. Besides aforenoted course contents, several lectures about emerging solutions for transport engineering (e.g., automated and connected vehicles, and machine learning for transport engineering).

Course Objectives

After the completion of this course, the students should be able to:

1) Understand the role of transportation in civil engineering profession and the role of transportation in the society.
2) Understand the concepts of transportation engineering that align with the main phases of every civil engineering project: planning, design, implementation, operations, and management.
3) Learn theoretical and computational methods applied to solve core highway and traffic engineering problems:
    - Know the detailed process of four-step transportation planning process,
    - Understand the models/methods in the four-step planning including trip generations, trip distributions, mode choice and traffic assignment,
    - Know the fundamentals of road vehicle performance and human factors,
    - Familiar with the fundamental principles of traffic characteristics
    - Learn basics of traffic flow theory, fundamental diagram and shockwave theory
    - Understand the road capacity and level-of-services
    - Know and understand road geometric design
    - Learn the fundamental principles in intersection and signal timing design
4) Acquire the information about the innovative transportation technologies such as automated vehicles and transport electrification.
5) Practice transportation engineering problems through active and engaging individual and team-based problem-solving, and connect the problem-based learning to real-world examples of transportation infrastructure projects.
6) Discover the potential career paths in the field of transportation engineering.
7) Enhance active learning and ability of solving transport-related problems.

Course materials:

All required materials will be available in Canvas. Copies of PowerPoint slides and recordings of lectures, will be made available to students in Canvas as well.

Course tasks and assessment

The course will involve the following teaching and learning components: lectures; in-class exercise; tutorials and quizzes; homework; and examination. The schedule for the above contents will be available on Canvas. The assessment of the course is based on performances in these components. Homework assignments are individual tasks. Meanwhile, there are several in-class exercises (by individuals or groups) during the lectures. Tutorials are given to enhance and recall the learned knowledge on time. Exam is open-notes (no electronic devices),

individual task, and it relies highly on in-class examples and exercises, tutorials as well as homework assignments.

The assessment of this course is based on the following four principles:

- Encourage active learning and reinforce learning.
- Robustly and fair evaluate student performance in the course.
- Fair and equitable for students to demonstrate what they have learned and their efforts.
- Maintain academic standards.

The detailed assessment criterion is summarized below.

Assessment Task	**Weighting (%)**	**Individual/ Group**	**Due (week)**
In-class exercises	10	**Individual/group**	Available in the schedule file at Canvas
Homework	40	**Individual**	
Final examination	50	**Individual**	

The homework will be graded by tutorial teachers. Therefore, it is not enough to get all the 40% points regarding homework by just submitting the homework. You have to do the homework perfectly to get all homework points.

The final grading system for the exam and the whole course is

Final report grade	**Overall score range**
Fail	0 ~ 59
3	60 ~ 75
4	76 ~ 90
5	91 ~ 100

The course instructors:

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