



EJ2440 Electric Transportation

6.0 credits

Elektriska transportsystem

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

Establishment

The official course syllabus is valid from the spring semester 2026 as decided by the Director of First and Second Cycle Education: HS-2025-1935, 3.2.2. Date of decision: 2025-10-14.

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Electrical Engineering

Specific prerequisites

Knowledge comparable to at least 2 of the following courses: EJ1200 Electric Power Systems, EJ2201 Electrical Machines and Drives or EJ2301 Power Electronics.

Intended learning outcomes

After passing the course, the student should be able to

- account for basic system engineering aspects of electric transport systems such as running resistance, traction, adhesion, power requirements and energy consumption
 - calculate tractive effort, power, acceleration, etc. for road and rail vehicles
 - account for the most important electric drive systems for road and rail vehicles
 - make estimations of voltages, currents and power of electrical drives for electric transportation
 - account for basic hybrid topologies, their working methods and main components
 - create and apply models for electric and hybrid vehicles to analyze their properties
 - account for the functional principle of energy-storing components such as batteries and supercapacitor, and calculate their basic performance
 - describe the structure of electric track supply systems, both with direct and alternating current
 - calculate the power capacity for different railway power supply systems
 - describe the background to electromagnetic interference in electric traction
- in order to gain a broad insight into electric traction, both for road and rail vehicles.

Course contents

Historical overview.

Incentives for environmentally friendly vehicles.

General principles of electric traction. Traction and braking effort. Power requirements and energy consumption.

Basic structure of conventional light and heavy road vehicles.

Propulsion and auxiliary systems for electric and hybrid road vehicles.

Traction vehicles: electric drive systems, transformers and converters, control and regulation and the mechanical transmission.

Track supply: DC and AC supplies, power transfer capacity, overhead catenary systems, over voltages, line interferences and electromagnetic compatibility.

Development trends.

Examination

- PRO1 - Project Work, 2.0 credits, grading scale: P, F
- TEN1 - Written Exam, 4.0 credits, grading scale: A, B, C, D, E, FX, 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.

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

Other requirements for final grade

Passed in all examination moments.

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.