EJ2440 Electric Transportation 6.0 credits

Elektriska transportsystem

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 EJ2440 valid from Spring 2015

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.

Language of instruction

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

Intended learning outcomes

Aim of the course is to give a broad insight into electrification of both rail and road bound transportation systems.

After completed course the student should be able to:

- describe fundamental system issues in electric transportation including e.g. tractive demands and power and energy consumption;
- calculate tractive effort, power, acceleration and velocity of rail and road vehicles;
- make estimations of voltages, currents and power of electrical drives for electric transportation;
- explain the most important electric drives for rail vehicles;
- describe generic hybrid topologies;
- explain how a hybrid vehicle works and describe its main components and their function;
- construct and apply models for electric and hybrid vehicles in order to analyse their performance;
- describe the operating principle for energy storage components, such as batteries and super capacitors, and calculate basic performance of them;
- describe the design of ac and dc power supplies for electric railway traction;
- calculate the power capacity for different railway power supply systems;
- describe the background to electromagnetic interference in electric traction.

Course contents

Historical survey.

Driving factors for environment friendly transportation.

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

Propulsion and auxiliary systems for conventional light and heavy road vehicles.

Propulsion and auxiliary systems for electric and hybrid vehicles.

Rail-borne vehicles; electric drives, transformers and converters, control and mechanical transmission.

Power supply systems; AC and DC supplies, power capacity, overhead catenary systems, over voltages, line interferences. Electromagnetic compatibility (EMC).

Development trends.

Disposition

Lessons, computer-aided exercises, seminar and project .

Course literature

Östlund, S.- Elektric Railway Traction, KTH 2012

Course binder Hybrid Vehicle Drives, KTH 2014

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.

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.