# Vehicle Propulsion Systems

Programme course

6 credits

Fordonsframdrivningssystem

TSFS03

Valid from: 2017 Spring semester

**Determined by**
Board of Studies for Electrical
Engineering, Physics and Mathematics

**Date determined**
2017-01-25

## Main field of study
Electrical Engineering, Mechanical Engineering

## Course level
Second cycle

## Advancement level
A1X

## Course offered for
- Mechanical Engineering, M Sc in Engineering
- Applied Physics and Electrical Engineering, M Sc in Engineering
- Mechanical Engineering, Master's programme
- Applied Physics and Electrical Engineering - International, M Sc in Engineering

## Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

## Prerequisites
Mechanics, Automatic Control, Optimization, Matlab/Simulink

## Intended learning outcomes
A course participant should after the course:
- have knowledge about traditional and hybrid powertrain configurations.
- be able to identify and enumerate different hybrid drive system configurations.
- have knowledge about and experience from working with models for components in advanced drivelines
- be able to discuss the advantages and disadvantages with different hybrid configurations
- be able to analyze complex powertrains from the perspective of energy efficient ground vehicle propulsion.
- have knowledge about tools for energy optimization of complex powertrains.
- have experience from using tools for energy optimization of complex powertrains
- have knowledge and experience in the synthesis and model implementations of new concepts for komplex powertrains

## Course content

This course treats the longitudinal behavior of road vehicles and gives a framework for analyzing and optimizing the energy consumption. Both traditional and new powertrain configurations (like hybrid and fuel cell vehicles) are treated. Realistic mathematical models are developed for the components and they are compiled to complete vehicle systems. These are then analyzed and used to develop optimized energy management strategies.

Several case studies are used to exemplify the methodology and show the principles and challenges associated with analyzing and optimizing complex powertrains.

## Teaching and working methods

The course is organized in lectures and computer exercises for completing hand in assignments.

## Examination

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|---|---|---|---|
| UPG1 | Assignments | 6 credits | U, 3, 4, 5 |

See the course home page for further details on examination.

## Grades

Four-grade scale, LiU, U, 3, 4, 5

## Department

Institutionen för systemteknik

## Director of Studies or equivalent

Johan Löfberg

## Examiner

Lars Eriksson

## Course website and other links

## Education components

Preliminary scheduled hours: 46 h
Recommended self-study hours: 114 h

# Course literature

Lino Guzzella and Antonio Sciarretta, ”Vehicle Propulsion Systems”, (2013), third edition, Springer Verlag. Laborationskompendium.

# Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.