Swedish Electromobility Centre

PhD COURSE, 5,0 hp

Electromobility Systems – Design Project

Welcome to

Swedish Electromobility Centre PhD course:

Electromobility Systems – Design Project

Examiner:

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Course literature:

Video lectures, online exercises and hand-outs available on the course portal.

Course credits (suggested):

The course is planned for 5.0 hp for students with engineering background. To have these credits within your PhD curriculum you need an approval of your examiner.

Course goal

After the course the participants have learnt:

- How systems of battery electric vehicles and stationary charging can be made cost effective and fit the need of different users.
- How some vehicle types differ regarding how they are best electrified.
- How the battery is sized to reduce overall system cost
- To suggest a suitable charging strategy for a vehicle
- Some different types of chargers and when they are suitable

From whom

The course is aimed for both engineers and researchers working on some aspect of

electromobility. It is open for PhD students within the field and employees of one of the partner companies in the Swedish Electromobility Centre.
The course is not aimed to make the participants experts on electromobility system design, but rather to make them so familiar with the overall system, its use and its total cost that they can become more effective within their respective areas and can cooperate effectively with experts working on other parts of the electromobility system.

Prerequisites

It is necessary to have a Master of Science in engineering, or corresponding experience, and to have a basic understanding of vehicles. Necessary basic analysis methods and equations will be introduced in the lectures, but it is expected that the participants have a basic understanding of energy and power. Detailed knowledge about vehicles or chargers is not required but will be useful in the course. If necessary, the project tasks can be somewhat adjusted to fit participants from different backgrounds.

Course structure

The course includes several parts which are mixed during the course:

- Course and project introduction via Zoom
- Online pre-recorded video lectures with online exercises, to be done individually at home. These lectures provide background knowledge about electromobility systems and how to analyze them.
- A project task divided into in three analysis steps, which is done in groups of about 3-6 participants. Each project group can decide individually when to work on their tasks.
- There will be some supervision times with each group, by Zoom or face-to-face in Göteborg, on times agreed between the teacher and the group.
- Three 4-hour online Zoom seminars are mandatory, at which the groups will present their project tasks followed by a discussion and comparison of the presented systems.

Project task

The core of the course is a project in which the group shall suggest a solution with electric vehicle, chargers and charging strategy for one type of vehicle. The proposed solution shall be analyzed using the methods taught in the course, and the result should show why the solution is cost effective and attractive for its intended customers.
The groups and the examiner jointly decide what vehicle each group shall analyze. Each group have their own vehicle to analyze such that the presentations and discussions shall demonstrate a wide set of different solutions. The vehicles to be studied may for example be different types of private cars, taxis, wheel loaders, buses, trucks, construction or mining equipment.

Project groups

The participants will be divided into smaller groups of 3-6 persons for the project tasks, preferably from the same city/area to simplify for the groups to meet.

Examination

The course will be graded “pass” or ”fail”. The grade “pass” requires

- The online question after each video lecture to be answered with a sufficiently many correct answers.
- All three project tasks to be solved, reported and presented satisfactory.
- Each participant has presented and been able to “defend” one part of the project tasks.

There will not be any written exam, but in the event of uncertainty or for instance that a student misses the final presentations due to illness, an individual oral examination may be used.

Cost

The course is free of charge for PhD students within the electro mobility field at a Swedish University and for participants from the partner companies in the Swedish Electromobility Centre.

The teacher organize the Zoom meeting rooms for supervision and for the project seminars, while the groups need to arrange suitable rooms for their own meetings or equipment for online group meetings.

Registration

Register at Swedish Electromobility Centre's website, **at the latest 2 November.**

Course schedule

Start 1 December 2020
End 12 February 2021

When	What	Estimated Time for participants	Where
Week 49	Introduction video. Video lectures and online exercises	2 h 10 h	At your computer At your computer
Week 50	Video lectures and online exercises Introduction to project task 1 Groups to discuss which vehicle to analyze	10 h 2 h 2 h	At your computer At your computer Group meeting
Week 51	Decide which vehicle to be analyzed with examiner Introduction to project tasks Project task 1	1 h 2 h 11 h	Online - Zoom At your computer Group/Individual
Week 52	Project task 1 Supervision meeting* X-mas	8 h 1 h -	Group/Individual online - Zoom
Week 53	New year	-	-
Week 1	Project task 1 Supervision meeting* Introduction to project task 2	12 h 1 h 1 h	Group/Individual online – Zoom At your computer
Week 2	Project seminar task 1 (exact time not decided) Project task 2	4 h 10 h	online - Zoom Group/Individual
Week 3	Project task 2 Supervision meeting*	13 h 1 h	Group/Individual online – Zoom
Week 4	Project task 2 Introduction to project task 3 Project seminar task 2 (exact time not decided) Project task 3	6 h 1 h 4 h 3 h	Group/Individual At your computer online – Zoom At your computer
Week 5	Project task 3 Supervision meeting*	13 h 1 h	Group/Individual online - Zoom
Week 6	Project task 3 Project seminar task 3 (exact time not decided)	10 h 4 h	Group/Individual online - Zoom
	total	133 h = 5 hp	
	*) supervision meetings will be arranged when the groups ask for them.		