Program Description

Master in Electromechanical Vehicle Engineering

TAELV – Autumn 26

Decision taken by	Department board
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Version	1
Adopted	2025-10-13

This template for programme descriptions was adopted by the Research and Education Board, HV 2022/508, 21 September 2022, editorial change 25 October 2022. Programme description is a supplement to the programme syllabus which is the legally binding document.

Basic data

Department	Engineering Science
Division	Division of Electrical engineering
Name of Programme, Swedish	Magister i elektriska fordon för maskiningenjörer
Name of Programme, English	Master in Electromechanical Vehicle Engineering
HE credits (number of credits)	60
Level (1st Cycle, 2nd Cycle)	2nd Cycle
Entry requirements, Swedish	Kandidatexamen inom maskinteknik eller motsvarande, alternativt en motsvarande högskoleingenjörsexamen inom maskinteknik. I utbildningen på grundnivå skall minst 5 hp programmering samt 15 hp matematik ingå. Engelska 6 eller Engelska nivå 2 eller motsvarande.
Entry requirements, English	Degree of Bachelor of Science in mechanical engineering or equivalent. Additionally the Bachelor of Science degree must be comprised of a minimum of 5 HE credits in programming and 15 HE credits in mathematics. In addition, verified knowledge of English corresponding to the course English 6 or English level 2 in the Swedish Upper Secondary School or equivalent.
Main field of study, Swedish	Maskinteknik
Main field of study, English	Mechanical Engineering
Degree, Swedish	Teknologie magisterexamen med inriktning mot elfordon
Degree, English	Degree of Master of Science (60 credits) with specialization in Electrical Vehicle Engineering
Rate of study (full-time, part-time)	Full-time
Type of instruction (on campus, distance teaching)	Campus, distance (with some meetings at campus)
Language of instruction (Sw, Eng)	English

General programme information

The electromechanical vehicle engineering programme is a one-year (60 ECTS credits), master education on-campus at University West, Trollhättan. The programme is developed in close collaboration with relevant industry. Courses covers the functionality of different components of an electric vehicles as well as other aspects such as sustainability and provides students with in-depth knowledge of electric driveline. The industry presence is integrated throughout the education through invited guest lectures and laboratory work. The programme prepares you for a career as a specialist in electric vehicles in the industry and building a foundation for further research.

Programme contents, structure, and progression

The electromechanical vehicle engineering programme, 60 ECTS credits, is a one-year master divided in four study periods. The courses within the programme offer in-depth knowledge of electric circuits, motor-topologies, electric drivelines, batteries, power electronics and measurement technology. The list of courses in chronological order with number of ECTS credits follows:

- Basics of Electrical Engineering for electric vehicles, 7.5 credits
- Guidelines for safety when working on and in electric vehicles, 2.5 credits
- Introduction to Electric Vehicle Systems and Components, 5 credits
- Electric Machines for electric vehicles, 7.5 credits
- Electromagnetic compatibility, 2.5 credits
- Electrical Measurement for electric vehicles, 5 credits
- Power Electronics, 5 credits
- Electrical Drive Systems, 5 credits
- Storage Systems in Electric Vehicles, 5 credits
- Degree Project in Electric Vehicle Technology, 15 credits

Upon completion of programme, the student will receive the degree:

Master of Science in Mechanical Engineering with a specialisation in Electromechanical Vehicle Engineering.

The research basis for the programme

Research education and international competitive research in the field was established at University West in 2019. Since then, the research group has expanded at to this date consists of four associate professors, two PhD students, three adjunts and three assistant lecturers. Research is conducted in all critical areas of electric drivetrains, including batteries, power electronics, control systems, flywheels, electric motors and materials as well as sustainability and production of electric vehicles. Researchers are involved in teaching and/or supervising within the programme providing a seamless integration of research in courses and degree work, offering students additional opportunities to deepen their knowledge, and addressing relevant research problems.

The labour market, collaboration, and work-integrated learning[1]

When the programme was designed, collaborating companies and stakeholders within the automotive industry were involved in shaping the program and informed about opportunities for skill development that the programme is able to provide among existing personnel. According to analysts and forecasts, Europe is a very important player for the transition to an electrified vehicle fleet and houses a significant automotive industry. In this transition, there will be a high demand for engineers with specialized knowledge in electromechanical engineering, both on a national and international market.

During the education, there are invited guest lectures from industry, laboratory work both on-campus and off-campus in facilities belonging to industry partners facilitating work-integrated learning as an integral part of the education.

Sustainable development

The overarching subject matter of the programme is electrification of the transport sector with the clear goal of reducing the ecological impact with more sustainable solutions compare to combustion of fossil fuels. Moreover, an attempt to cover the complete life cycle analysis from production to recycling of vehicles, including

[1] Work-integrated learning is a pedagogical practice in which students' learning takes place through the integration of theoretical and practical knowledge and experience, derived from an educational context within the framework of both higher education as a work environment and civil society.

economic sustainability in terms of cost of materials and energy production are included in the programme.

Internationalisation

Students from around the world come together in our programme to create a unique and international environment. You have the opportunity to interact with people having different experiences and background from your own enhancing your social skills and ability to collaborate and working in a group.

Other information

After finishing the programme and receiving the degree, the student will be highly sought after by the automotive industry. On a regional level, Volvo Cars, CEVT and Polestar (among others), all situated close to University West, are continuously looking for specialised mechanical engineers with the international competencies gained in the programme.