Project title	**Education in Hydrogen Technologies Area**
Project number	2021-1-CZ01-KA220-VET-000028073

Curriculum

Module title	**Hydrogen vehicles with fuel cells**
Number of lessons	Expected number of educational lessons necessary to achieve the learning outcomes assigned by education units Total number of lessons: 20 Number of theoretical lessons: 10 Number of vocational training lessons: 10
Entry requirements	For successful completion of the module, a student has to have these entry vocational competences: a) Be able to perform assembly, repair and maintenance of electrical devices in accordance with occupational safety requirements and standards for vocational qualification in electrical engineering b) Be able to perform electrical measuring and evaluation of measured results c) Use technical documentation d) Mind occupational safety and health protection at work
Brief summary of module aim	The module provides an overview of the possibilities and reasons for the use of hydrogen in vehicles. It introduces students to the principles of obtaining hydrogen from fossil fuels, biomass or electrolysis, even with the help of renewable sources. Describes the history of the use of fuel cells, their types and physical principles. The module deals with the design and parameters of electric drives used in the vehicle. Describes the properties of individual drive parts. It introduces students to the current use of fuel cells in vehicles, agricultural machinery and public transport. It compares the parameters of vehicles with fuel cells from individual manufacturers.
Expected learning outcomes (educational)	The student is familiar with the reasons for the use of alternative fuels in terms of fossil fuel consumption and production of harmful emissions. He has an overview of ways to produce hydrogen and use its energy. Can describe the types and principle of fuel cells as sources of electricity. The student knows the construction of individual electric drives used in the vehicle and their properties. The student is acquainted with current examples of the use of fuel cells in vehicles and vehicles.
Module outline	Module outline 1. Introduction - Reasons for using hydrogen as a fuel in vehicles 2. Hydrogen as an energy source 3. Fuel cells 4. Electric drives in vehicles 5. Vehicles powered by hydrogen

Recommended educational practices (methods)	Basic methods and forms of education are: – verbal method – explanation – demonstrative visual method – demonstration and observation, work with images, instruction – skill and practical methods – imitating, manipulating, experimenting and lab techniques – activating methods - discussion, problem solving – group learning – group and cooperative learning, homogenous and heterogeneous pair classes, individual classes
Mode of module completion	Practical exam with a test of vocational skills with the final assessment – "pass – fail".
Assessment standards of educational outcomes	The basis of assessment is overall module classification. The emphasis is primarily put on depth of the topic understanding, logical thinking and ability to apply the knowledge in practice while solving application tasks. There is important the whole manifestation of student, his activity during classes and ability of self-evaluation. Knowledge of the particular topic is examined in written or verbal examination. There are emphasized coherence, fluency and content correctness of talking.

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