



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

Curriculum

Module title	Hydrogen production and safety
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) General knowledge of hydrogen production and application b) Be able to perform measuring and calculation and evaluate results c) Use technical documentation d) Use modern learning technologies e) Mind occupational safety and health protection at work.
Brief summary of module aim	This module provides the general knowledge of physical nature and technology of hydrogen production and its storage safety. The module introduces students to the various technologies of hydrogen production and the use of this energy source in the automotive industry. The module further describes the function of fuel cells and their types. The module presents a overview of the issue of the subsystem applied in automotive technology with emphasis on safety and complexity in storage and distribution. A significant aim is also the education to responsible attitude to running of hydrogen car which can endanger health and safety of users and fellow citizens in case of incorrect use. An indispensable part of education is the environmental education that leads to responsibility while using motor vehicles.
Expected learning outcomes (educational)	The student is familiar with the history of hydrogen technology and the properties of hydrogen as an energy source. He can name the basic production technologies of hydrogen and compare their advantages and disadvantages, including energy intensity of production. The student is able to define individual types of fuel cells and is familiar with the construction of the fuel cell. The student also recognizes the differences in the possibilities of hydrogen storage and describes the advantages and disadvantages between the various types. In terms of safety, he can debate the possibilities of hydrogen storage and its security in automotive technology.
Module outline	Module outline 1. Introduction - Hydrogen, characteristics, history 2. Hydrogen production from fossil fuels 3. Hydrogen production from renewable sources 4. Fuel cells 5. Safety and hydrogen storage



Recommended educational practices (methods)	Basic methods and forms of education are: <ul style="list-style-type: none">– 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– e-learning course supported by presentations and illustrative photographs
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.