**Training Fiche**

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| **Title** | Theoretical training in the drone industry based on STEM subjects in vet education |
| **Keywords** | STEM, connecting STEM subjects with drone operation, drone construction, drone operation |
| **Provided by** | Kuldiga Technology and tourism technical school, Latvia |
| **Language** | Englisch |
| **Name of the professional profile** | STEM subjects in a drone environment |
| **Profile of the qualification and training goals** | Learn and apply the specifics and characteristics of drones. Understand the construction of drones. Identify the problem and fix it. |
| **Duration and scope** |  |
| **Admission requirements** |  |
| **Training structure and modules** | STEM subjects STEM subjects in the field of drones Course topics for drone operation STEM categories in drone training |
| **Objectives and goals** | To understand how related STEM subjects are in the construction, operation, and application of drones. Be able to apply the knowledge gained in the training program in the operation of drones. |
| **Learning outcomes** | Diagnose problems and find solutions in drone operations. |
| **Learning field** |  Theoretical knowledge in the operation, construction and application of drones. |   |
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| **Content index** | **Unit 1:** Introduction to the meaning of STEM STEM fields of study, directions **Section 1.1:** What is STEM **Section 1.2:** What are STEM subjects **Section 1.3:** How STEM influences modern learning **Unit 2:** Bridging STEM disciplines in drone operations In which STEM areas can we use drones? **Section 2.1:** STEM learning directions in drone operation **Unit 3:** Teaching subjects in drone training Subjects **Section 3.1:** Drones in science subjects **Section 3.2:** In technological subjects **Section 3.3:** Engineering subjects **Section 3.4:** In mathematical subjects |

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| **Content development** | **Unit 1:** Introduction to the meaning of STEM STEM fields of study, directions **Section 1.1:** What is STEM? Science and technology subjects (called STEM - from the English language Science, Technology, Engineering and Mathematics) explain the environment in which we find ourselves. Physics, chemistry, mathematics and biology describe the laws and processes of the surrounding nature, while informatics and computer science give us an idea of how things work technologies. Education is important for every person, family, society and country as a whole. It is the way to the quality of a person's individual life, the creation of a knowledge society and the economic growth and prosperity of the country. Investments in education and lifelong learning are an essential prerequisite for the development of the national economy and the promotion of the country's competitiveness, as well as for achieving a higher level of well-being. STEM is an educational program that focuses heavily on science, technology, engineering, and mathematics.**Section 1.2:** What are STEM subjects? STEM subjects will include mathematics, science, biology, geography, physics, chemistry, design and technology, computer science, engineering, programming, robotics and digital design.**Section 1.3:** How does STEM affect modern learning? Realizing that one of the key components of future education is the development of 21st century skills, which have yet to be precisely defined and assessed, technology and science skills play an important role, so they are closely related to future employment and quality of life. In recent years, however, the field of STEM education has experienced various criticisms. It is rather difficult to achieve a comprehensive integration of the different fields of STEM, partly because the nature of the disciplines is quite different, with fields such as science and technology more represented than mathematics and engineering (Haesen and Van de Put, 2018). Therefore, more and more often, the STEM acronym is supplemented with the letter "A" - Art (art), which makes the lessons a creative learning environment and learners purposefully experiment and participate in experimental learning, constantly solve problems, collaborate and learn through the creative process (The Institute for Arts Integration and STEAM, 2020).**Unit 2:** Bridging STEM disciplines in drone operations In which STEM areas can we use drones? **Section 2.1:** STEM learning directions in drone operation As much as drones are today's devices, their relationship to STEM subjects is directly related. Drones use all 4 areas of STEM learning.**Unit 3:** Teaching subjects in drone training Subjects **Section 3.1:** Drones in science subjects Lifting power The dynamics of rowing Lifting capacity - dead weight**Section 3.2**: In technological subjectsIntroduction to mechatronicsControl systems and feedback mechanismsActuators and sensorsElectronic control systems and programmingTypes of aircraft lighting systemsElectrical and optical principles of aircraft lightingInstallation and maintenance of aircraft lighting systems**Section 3.3:** In engineering subjectsBasic Electrical and Electronics TheoryIntroduction to electrical and electronic systems in aircraftElectrical and electronic theory and principlesElectrical safety and regulationsElectrical and electronic circuits and componentsIntroduction to avionics systemsNavigation and communication systemsFlight control systemsInstrumentation and display systemsElectrical power generation systemsAircraft electrical power distribution systemsElectrical load management and controlBattery systems and chargingBasic principles of computer scienceProgramming languages and algorithmsData structures and databasesComputer architecture and componentsOperating systems and software applications used in avionicsAircraft data networks and communication protocolsPrinciples of communication systemsTypes of communication systemsAvionics system integrationTesting and certification of avionics systems**Section 3.4:** In mathematical subjects Battery capacity - consumption Rotor area - lifting capacity |
| **Glossary** | **STEM:** Science, Technology, Engineering and Mathematics including biology, geography, physics, chemistry, design and technology, computer science, engineering, programming, robotics and digital design. One of the key components of future education is the development of 21st century skills, assessed, technology and science skills play an important role, so they are closely related to future employment and quality of life.Source: https://ppdb.mk.gov.lv/wp-content/uploads/2021/06/STEM\_petijums\_gala\_zinojums\_PETIJUMS\_ANOTACIJA.pdf**STEM basad learning in drones:**Undoubtedly, interest in drones as a consumer product is growing. Thus, the demand for education and training around them is increasing. The STEM Drone Orientation is one example of a program that paves the way for STEM education for students.Source: tryengineering.org**Drone teaching subjects:**When Leonardo da Vinci in the second half of the 15th century drew a sketch very similar to a modern unmanned aerial vehicle among other inventions, he probably did not think that four hundred years would pass until such devices would gradually acquire real outlines and applications. First of all, as has often happened elsewhere in the history of mankind, this innovation was pushed forward by wars and military needs, but in the XXI century, the development of technology has given unmanned aerial vehicles a victory march in the civilian world as well.Source:epale.ec.europa.euDrone robotics is the most advanced of robotics where you can learn soldering skills and microelectronics knowledge. As technologies develop, this knowledge and skills remain very relevant. Do you know a single electronic device without solder? And drones are a special electrotechnical device that must be soldered in such a way that no accidents affect its ability to continue operating. While learning to pilot drones, students develop spatial sense, the ability to concentrate, and strategic thinking.Source: e-klase.lv |
| **Self-evaluation (multiple choice queries and answers)** | 1. STEM is: **a) Science, Technology, Engineering and Mathematics**b) Social terms in English managmentc) System termal esmission monitoring2. Drone is:a) Unidentified Flying Object**b) An unmanned aircraft**c) Drop down menu3. Drone learning subjects:**a) Electronic, programming and piloting**b) Swimming, jumping and aviation c) Splicing, screwing and melting  |
| **Reference material** | Author: SIA “Dynamic University” Title: A study of the educational offer coverage and learner engagement in the STEM field.Publisher:Ministry of Education and Science Date of Publication: 2021. juneURL: <https://ppdb.mk.gov.lv/wp-content/uploads/2021/06/STEM_petijums_gala_zinojums_PETIJUMS_ANOTACIJA.pdf>Author: TechtargetTitle: dronePublisher:TechtargetDate of Publication: Not specifiedURL:https://www.techtarget.com/iotagenda/definition/droneAuthor: epale.ec.europa.eu/Title: Drones now and in the future.Publisher:epale.ec.europa.eu/Date of Publication: 8 march 2022URL:https://epale.ec.europa.eu/lv/blog/droni-tagad-un-nakotne-kas-jazina-pilotiemAuthor: tryengineeringTitle: STEM Drone OrientationPublisher:tryengineeringDate of Publication: Not specifiedURL:https://tryengineering.org/lv/news/program-spotlight-stem-drone-orientation/ |
| **Resources (videos, reference link)** | Amtech training Amtech training module STEM based drone learning.pptx |