



Sustainable Modular Houses for People in Need
2021-1-EL01-KA220-VET-000025502

INTELLECTUAL OUTPUT 2

VET online course
“Sustainable Modular Houses for
People in Need”

Job profile / **Engineer**
Learning Units & Outcomes



Job profile

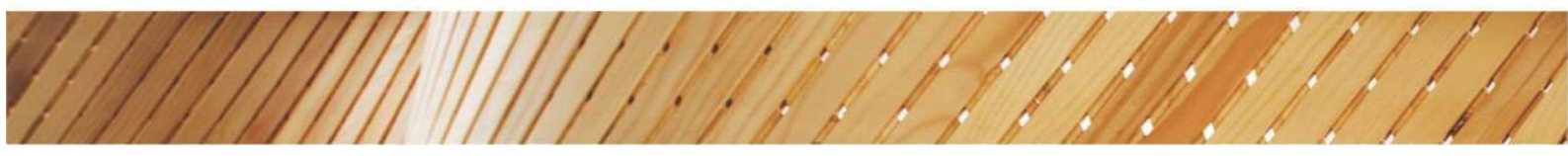
Job Title	Engineer of Sustainable Modular Houses for People in Need.
EQF Level	Level 5 Post-Secondary Qualification (professional specialization)
Job description	<p>An Engineer of sustainable modular houses oversees the construction, design, and sale of environmentally friendly and sustainable modular homes. They lead a team of designers, architects, and builders to ensure the homes are built to the highest standards of quality and sustainability, while also marketing and selling the homes. The manager must have knowledge of sustainable building practices, construction management, project management, and stay up to date with regulations and codes.</p>
Entry requirements	<ul style="list-style-type: none">○ EQF level 5 completed○ Interest in acquiring specialized knowledge in sustainable modular houses○ At least one year work experience in sustainable modular houses management, production operations○ Specialised, factual and theoretical knowledge within the field of sustainable modular houses management and specific production operations



Activities

1. Overseeing the design and construction of modular homes to ensure they meet high sustainability standards, while also adhering to local building codes and regulations.
2. Collaborating with designers, architects, and engineers to develop plans and blueprints for sustainable modular homes that meet customer needs and preferences.
3. Sourcing materials and supplies that are eco-friendly and sustainable, such as recycled materials, low-emitting insulation, and energy-efficient appliances.
4. Managing construction timelines and budgets to ensure projects are completed on time and within budget, while maintaining quality standards.
5. Ensuring that the construction process is efficient and safe, with minimal waste and maximum energy efficiency.
6. Coordinating with subcontractors and suppliers to ensure that they meet sustainability and quality standards.
7. Developing marketing and sales strategies to promote the sustainable modular homes to potential customers.
8. Networking with industry professionals, such as real estate agents and contractors, to build relationships and expand business opportunities.
9. Staying up to date with advances in sustainable building practices and technologies and integrating them into design and construction processes.
10. Maintaining customer relationships and providing ongoing support and service to ensure customer satisfaction and repeat business.

<p>Level 5</p>	<p>Comprehensive, expertise, factual and theoretical knowledge in a study/work-related topic and understanding the limitations of one's knowledge</p>	<p>Large range of cognitive and practical skills for conceiving creative solutions to abstract problems</p>	<p>Manage and supervise in study/work-related contexts, subject to unpredictable changes.</p>
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Learning Units

A Learning Unit consists of a coherent combination of learning outcomes, subject to evaluation and autonomous validation. Learning outcomes consist of knowledge, skills and competences that are mobilised in actions through which the individual shows / demonstrates mastery of the acquired learning outcome, in accordance with certain performance criteria and context conditions.

Learning Units	
Learning Unit (LU) 1	INTRODUCTION TO TIMBER FRAME MODULAR HOUSES (MICRO UNITS) FOR PEOPLE IN NEED
Learning Unit (LU) 2	NATURAL MATERIALS (TIMBER) AVAILABLE FOR BUILDINGS IN DIFFERENT REGIONS IN EUROPE
Learning Unit (LU) 3	PRINCIPLES OF SUSTAINABLE DESIGN FOR MODULAR MICRO-UNITS
Learning Unit (LU) 4	METHODS FOR OFF-SITE MANUFACTURING
Learning Unit (LU) 5	FIRE SAFETY AND QUALITY CONTROL OF TIMBER MODULAR HOUSES



Learning Outcomes



The Learning Outcomes break down into knowledge skills and competencies that are mobilised in actions/achievements through which the individual shows/ demonstrates the required field of competence, according to a certain performance criteria and context conditions.

Learning Unit 1

LU1 is about approaching the basic principles of sustainability and focus on constructing a modular house for several and different needs. This is translated into viable engineering by adapting technologies, processes, and materials towards a smart use of natural resources as well as residue materials or reused ones.

This LU is about creating not only a philosophy but also providing practical steps on how to design, prefabricate, transport, build-assembly, reprocess after the end of its use modular construction with timber as the primer material. Basic pillars through this procedure are to respect the natural resources, the people, and the places where these units will be temporarily placed. Small modular units are to be joined together to form a practical and comfortable modular micro building to host size-wise different ranges of people with dissimilar needs.

Learning Unit 1	INTRODUCTION TO TIMBER FRAME MODULAR HOUSES (MICRO UNITS) FOR PEOPLE IN NEED
Sub-Contents	<ul style="list-style-type: none"> ○ Basic sustainability principals ○ Modular construction from natural materials (timber) ○ Accommodating needs of displaced people ○ Assembly and disassembly key aspects for small house units





Learning Outcomes

Knowledge	Skills	Competences
<p>Classify the sustainability principles related to housing needs.</p> <p>Report natural materials (timber) can assist in achieving an eco-friendly and sustainable house construction approach.</p> <p>Explain in detail the needs for temporary accommodation of people in need.</p>	<p>Design modular houses that accommodate diverse needs and populations</p> <p>Apply sustainable design principles in the conceptualization of modular housing units.</p> <p>Select the proper natural materials that can be used to cope with an urgent housing need.</p>	<p>Be able to understand the concept of modular building solutions for people in need using sustainable natural materials with the aim to have as an output a quick and robust housing option which will be assembled and dis-assembled after the end of use.</p>
<p>Main action / achievement:</p>		<p>Workload</p>
<p>The main achievement is the ability to manage the entire concept of a modular construction from natural materials to assist the need for an urgent accommodation of people in need. This includes understanding the whole approach from using locally sourced resources which will be used as efficient as possible to create modular micro units.</p>		<p>10 hours</p>

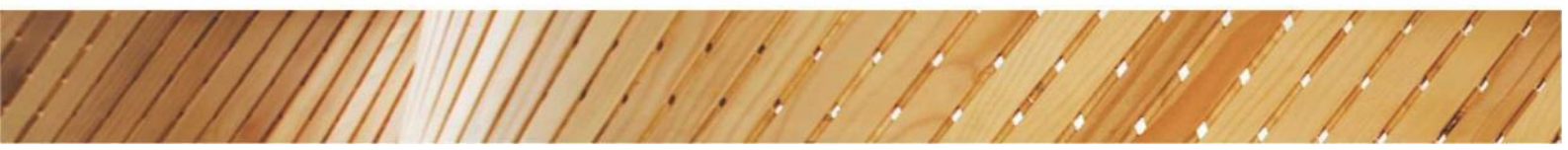




Learning Unit 2

LU2 refers to the various types of wood that are harvested and used for construction in different parts of Europe. The available timber species can vary by region, and can include softwoods such as spruce, pine, and fir, as well as hardwoods like oak, beech, and ash. The material is harvested through a variety of methods, including clearcutting, selective logging, and sustainable forestry practices. Processing methods can include sawmilling, planing, and treating the wood for durability and insect resistance. Timber for construction is subject to different regulations and standards in each region and must adhere to environmental certifications and legal requirements. Managing timber for construction involves understanding the properties and characteristics of different species, selecting appropriate types for different building applications, estimating quantities and costs, managing procurement and supply chain logistics, designing structures, ensuring durability and sustainability, and communicating effectively with stakeholders to promote the use of timber in sustainable building practices.

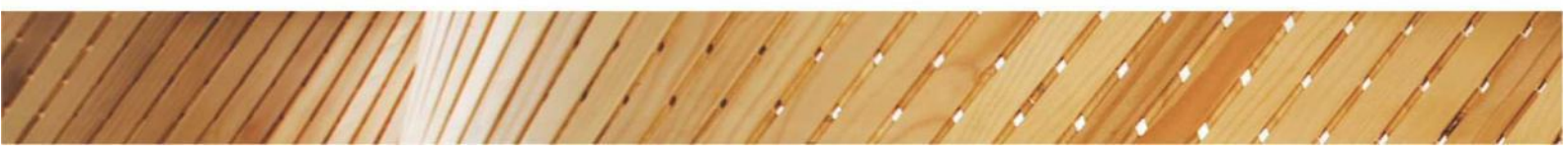
Learning Unit 2	NATURAL MATERIALS (TIMBER) AVAILABLE FOR BUILDINGS IN DIFFERENT REGIONS IN EUROPE
Sub-Contents	<ul style="list-style-type: none">○ Properties and characteristics of timber species○ Harvesting and production methods, and environmental impacts○ Sustainable forest management practices○ Regulations and standards for timber use in construction○ Timber selection, procurement, and supply chain logistics





Learning Outcomes

Knowledge	Skills	Competences
<p>Describe the properties and characteristics of various timber species used in construction across different European regions.</p> <p>Know about sustainable forestry practices and the environmental impact of using timber as a building material.</p> <p>Have deep knowledge of the different harvesting and production methods for timber, and the associated environmental impacts</p>	<p>Select appropriate timber species for specific construction applications based on their properties and characteristics.</p> <p>Calculate the costs associated with timber procurement, taking into account factors such as species, quality, and transportation.</p> <p>Apply the proper regulations and standards related to timber use in construction, including environmental certifications and legal requirements.</p>	<p>manage the entire lifecycle of timber for construction effectively and sustainably (understanding timber properties, selecting appropriate species, estimating quantities and costs, managing procurement and logistics, designing structures, ensuring durability, and promoting sustainability)</p>
<p>Main action / achievement:</p>		<p>Workload</p>
<p>The main achievement is the ability to manage the entire lifecycle of timber for construction effectively and sustainably. This includes understanding timber properties, selecting appropriate species, estimating quantities and costs, managing procurement and logistics, designing structures, ensuring durability, and promoting sustainability. The outcome is a more sustainable and environmentally friendly construction industry.</p>		<p>20 hours</p>





Learning Unit 3

LU3 refers to the incorporating environmentally conscious and energy-efficient practices into the design and construction of small living spaces. This includes the use of sustainable materials, such as recycled or renewable materials, and the incorporation of energy-efficient technologies, such as solar panels and efficient HVAC systems. The design should also maximize natural light and ventilation and utilize space-saving techniques to optimize the use of the limited living space. Additionally, the units should be designed to minimize waste and have a low carbon footprint, with a focus on reducing energy consumption and water usage. The aim is to create functional, comfortable, and eco-friendly living spaces that promote sustainable living practices.

Learning Unit 3	PRINCIPLES OF SUSTAINABLE DESIGN FOR MODULAR MICRO-UNITS
Sub-Contents	<ul style="list-style-type: none"> ○ Introduction to sustainable design principles for modular micro-units ○ Energy-efficient technologies and systems for small living spaces ○ Sustainable materials and construction methods ○ Maximizing natural light and ventilation in small spaces ○ Space-saving techniques and functional design ○ Reducing waste and minimizing environmental impact ○ Promoting sustainable living practices in micro-unit design.





Learning Outcomes

Knowledge	Skills	Competences
<p>Define and articulate the fundamental principles of sustainable design as they apply to modular micro-units.</p> <p>Know about various sustainable design strategies, including site planning, energy efficiency, water conservation, renewable energy technologies, and material selection.</p> <p>Understanding of the life cycle assessment of building materials and how it can inform sustainable design decisions.</p> <p>Familiarity with regulations and policies related to sustainable design and construction.</p>	<p>Ability to identify sustainable design principles, including energy efficiency, use of sustainable materials, and incorporation of renewable energy sources.</p> <p>Capacity to assess the environmental impact of different design choices and make informed decisions about sustainable design strategies.</p> <p>Expertise in evaluating the performance of sustainable design strategies and making data-driven decisions for continuous improvement.</p>	<p>integration of sustainable living practices such as the design of micro-units, considering energy efficiency, waste reduction, and water conservation. Eco-friendly design such as Evaluate and select design elements that contribute to the overall eco-friendliness of the living space and user-centric sustainability.</p>
Main action / achievement:		Workload
<p>The main achievement is to design and construct energy-efficient and environmentally conscious small living spaces, which incorporate sustainable materials and construction methods, maximize natural light and ventilation, and use energy-efficient technologies and systems. Learners will be able to create functional, comfortable, and eco-friendly living spaces that promote sustainable living practices.</p>		<p>20 hours</p>





Learning Unit 4

LU4 refers to the use of efficient and sustainable construction practices to produce homes in a controlled factory setting. This includes using sustainable and recyclable materials, optimizing the use of energy and resources, and reducing waste during the manufacturing process. The modular units are designed for easy transport and assembly on-site, reducing the need for extensive on-site construction and minimizing the environmental impact of the building process. The use of digital technology, such as building information modeling (BIM) and prefabrication, also allows for greater precision and efficiency in the manufacturing process. Ultimately, the aim is to create sustainable, high-quality housing that is affordable, energy-efficient, and easy to construct.

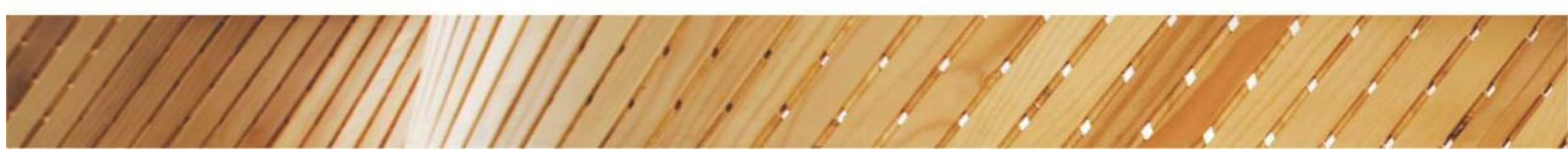
Learning Unit 4	METHODS FOR OFF-SITE MANUFACTURING
Sub-Contents	<ul style="list-style-type: none">○ Overview of off-site manufacturing and its benefits○ Sustainable building materials and their applications in off-site manufacturing○ Digital technologies for efficient manufacturing processes○ Quality control measures for off-site manufacturing○ Transportation and logistics of modular units○ On-site assembly and installation of modular units○ Maintenance and repair of modular structures.





Learning Outcomes

Knowledge	Skills	Competences
<p>Define and explain the concept of off-site manufacturing and articulate its benefits.</p> <p>Have deep knowledge of the different materials and components used in off-site manufacturing.</p> <p>Familiarity with the different software used in off-site manufacturing, such as computer-aided design and manufacturing, robotics, and automation.</p> <p>Recognize the role of quality control and testing to ensure structural integrity, durability, and safety of the finished product.</p>	<p>Identifying appropriate materials, machinery, and equipment required for off-site manufacturing of timber modular houses.</p> <p>Develop and implement production schedules and project plans to ensure efficient and timely manufacturing.</p> <p>Develop and implement quality control measures to ensure compliance with manufacturing standards and regulations.</p>	<p>Design and construct sustainable and energy-efficient modular timber micro-units with quality control procedures and managing and supervising teams of workers and contractors involved in off-site manufacturing.</p>
Main action / achievement:		Workload
<p>The main achievement is to design and construct sustainable and energy-efficient modular timber micro-units with quality control procedures, ensuring a durable and safe structure that meets the highest standards. Learners will understand the benefits and challenges of off-site manufacturing and sustainable building materials and will be able to oversee the transportation and logistics of modular units and on-site assembly and installation. They will also develop an understanding of quality control measures and maintenance and repair of modular structures.</p>		<p>25 hours</p>





Learning Unit 5

LU5 refers to the fire safety and quality control which are crucial aspects of timber modular houses. The use of timber as a building material requires careful consideration of fire safety measures, including the use of fire-resistant materials, smoke alarms, and sprinkler systems. Quality control is also essential to ensure that the timber used in construction is of high quality and free from defects that could compromise the safety and durability of the structure. Quality control measures can include regular inspections of the timber during the manufacturing process and on-site assembly, as well as testing for strength and durability. Proper installation of fire safety measures and quality control procedures can ensure the safety and longevity of timber modular houses.

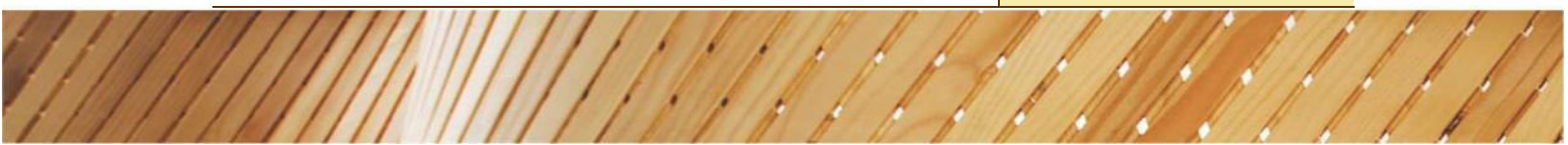
Learning Unit 5	FIRE SAFETY AND QUALITY CONTROL OF TIMBER MODULAR HOUSES
Sub-Contents	<ul style="list-style-type: none">○ Fire safety regulations and requirements for timber modular houses○ Types of fire-resistant materials and their applications○ Smoke detection and suppression systems○ Quality control procedures for timber selection, production, and assembly○ Inspection and testing for strength and durability○ Maintenance and repair of timber structures○ Training and education for fire safety and quality control measures.





Learning Outcomes

Knowledge	Skills	Competences
<p>Recognize relevant building codes, standards, and regulations related to fire safety and quality control in timber modular construction.</p> <p>Identify different types of timber and their fire-resistant properties, as well as fire-retardant treatments and coatings that can enhance the fire safety of timber structures.</p> <p>Define fire safety measures for timber modular houses, including fire-resistant barriers, fire suppression systems, and fire alarms.</p> <p>Have knowledge of quality control measures for timber modular construction, such as material testing, manufacturing standards, and inspection and testing protocols.</p>	<p>Conducting fire risk assessments and implementing fire safety plans to ensure the safety of occupants and compliance with regulations.</p> <p>Evaluating different fire protection systems and materials to select appropriate options for specific project requirements.</p> <p>Implementing quality control measures throughout the construction process to ensure compliance with standards and regulations.</p>	<p>Design and construct fire-safe and durable timber modular houses with quality control procedures, ensuring a safe and sustainable structure that meets the highest standards.</p>
Main action / achievement:		Workload
<p>The main achievement is to design and construct fire-safe and durable timber modular houses with quality control procedures, ensuring a safe and sustainable structure that meets the highest standards. Learners will understand fire safety regulations and requirements for timber modular houses, types of fire-resistant materials and their applications, and smoke detection and suppression systems. They will be able to implement quality control procedures for timber selection, production, and assembly and will also develop an understanding of inspection and testing for strength and durability and maintenance and repair of timber structures.</p>		<p>25 hours</p>





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