

Deliverable R3.1

Modular VET curricula



ENVIRONMENTALLY CONSCIOUS SMART LIGHTING

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Short Description	This report presents the competence based modular VET curricula for the ECOSLIGHT job role profiles that were selected for the establishment of the pilot ECOSLIGHT VET activities. Each curriculum is synthesized from the set of competences produced in WP2, so as to meet the needs of one job role profile. The modular approach makes easy the adaptation of curricula and the synthesis of new curricula to meet emerging professional needs at different levels.
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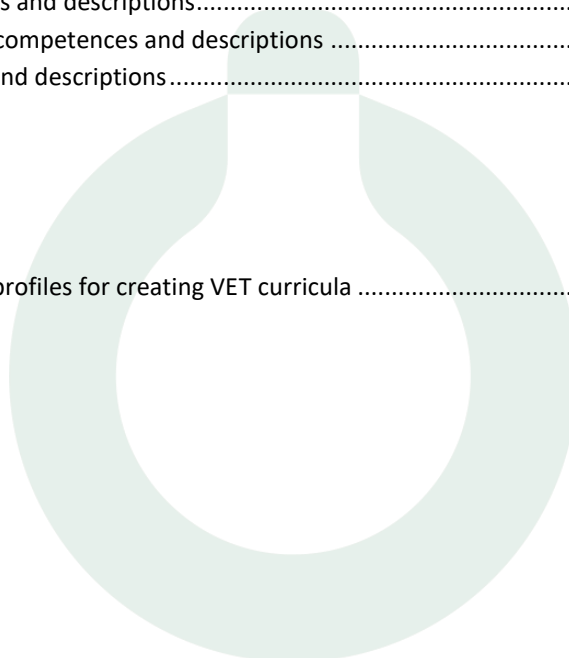
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Abstract

This deliverable entitled “Modular VET curricula” provides the four VET curricula required for the professional development under each one of the ECOSLIGHT Job Role Profiles that were selected for the provision of human capital development activities.

The profiles selected – among the “ideal” ECOSLIGHT profiles are the **Smart Lighting Systems Technician**, the **Lighting Consultant**, the **Lighting Systems Assistant Engineer**, and the **Landscape and Street Lighting Technician**. These four profiles are in compliance with the selection criteria, i.e. to correspond to the EQF level 5 (an agreed priority with the funding agency for the ECOSLIGHT project), and to be compliant with the needs identified under the surveys conducted in *WP2: Identification and Emerging Roles and Needs in the Lighting-related Construction Sector*.



1 Introduction

As the ECOSLIGHT surveys (quantitative and interviews) conducted under the *WP2: Identification and Emerging Roles and Needs in the Lighting-related Construction Sector* underlined, there is a demand for professionals in the lighting-related sub-sector of the construction sector, and the currently offered training programs do not correspond to those needs. These problems necessitate (a) the development of more professionals to join the lighting sector, and (b) the development of training programs. Concerning the latter, currently some training programs are offered by universities, sectoral actors and some VET institutions, but these programs are either outdated or do not correspond to the market needs. Concerning the professionals employed, many of them have a bachelor and / or a Master's degree (e.g. Architects, Engineers, etc), and have some years of experience in the sector activities in order to be efficient and competitive. Therefore, the sector needs the development and recruitment of more professionals that will have oriented / practical knowledge on the field.

The ECOSLIGHT comes to cover these needs through the establishment of a series of emerging Job Role Profiles and the establishment of the respective VET curricula. These curricula will be modular and will include the delivery of theoretical knowledge (through a MOOC and a specialization course that includes online and face-to-face training) and work-based learning. The modular approach in curricula implementation is a recent move with particular benefits; it considers an outcome-based paradigm, based on the principle of dividing the curriculum into small discrete modules or units that are independent, non-sequential, and typically short in duration. These modules are characterized by particular learning outcomes, enhancing the reusability of the content, the recognition of the learning, the mobility of the workforce, etc. A modular approach to teaching supports the learner to gain control over his or her learning and to accept greater responsibility for learning.

Curricula are typically used as dynamic frameworks that guide the teaching and learning process, the recruitment and assessment, and overall the human capital management and development activities. The adoption of the learning outcomes approach in curriculum development, identifying what a learner knows and being able to do upon completion of a training activity / process, no matter how, when and where this learning takes place, is considered as an effective way to bridge the gap between the market needs and the training supply (Cedefop, 2010). Moreover, this approach – together with the establishment of modular VET curricula – enables the learners (and the VET providers) to establish learning pathways, increases the possibilities of validating and recognizing prior learning, and enhances the mobility of professionals between countries and sectors. In the EQF, learning outcomes are defined as “statements of what a learner knows, understands and is able to do on completion of a learning process”. The common European tools developed in the framework of the Copenhagen process, including the EQF and the European credit system for VET (ECVET), use learning outcomes as a key mechanism to reach the objective of “transparency, comparability, transferability and recognition of competences and/or qualifications, between different countries and at different levels” (Copenhagen declaration, 29-30 November 2002). As the Cedefop (2017) underlines, the learning outcomes are used in qualification frameworks, in qualification profiles / standards, in occupational standards, in curricula and in assessment specification or standards.

Under the ECOSLIGHT project, four (4) emerging VET curricula for lighting professionals were designed and developed including blended learning (online, face to face and work based learning), which are provided to the lighting professionals during the project lifecycle. These curricula are also valuable for the market, for policy development, and VET stakeholders (providers, experts, adult trainers, etc). Each curriculum is synthesized by a list of competences, categorized as *lighting-related*, *digital*, *green*, *entrepreneurship* and *life* competences.

Lighting competences originate from the state-of-the-art, were identified from various studies and stakeholders of the sector, and are considered as the actual competences required for the implementation of various tasks in the lighting area.

Digital competences are in general categorized as *basic* and *advanced*. *Basic digital competences* originate from the DigComp framework; The EC has established the DigComp framework, i.e. the European Digital Competence Framework for Citizens that consists a tool to improve digital competences. The latest version, DigComp 2.1 was established in 2017. It includes 21 digital competences grouped into 5 areas, accompanied with proficiency levels. On the other hand, ICT professionals have greater demands in digital competence needs, i.e. they have *advanced digital*

competence needs. CEN has produced the e-CF 3.0, the European e-Competence Framework, a common European framework for ICT professionals in all industry sectors. It includes 41 competences categorized into five areas. It was established as a tool to support mutual understanding and to provide transparency of language through the articulation of competences required and deployed by ICT professionals (including both practitioners and managers). The framework has proficiency levels as well, aligned with the EQF (e-1 to e-5, relate to EQF 3-8). The e-CF framework is supported by the long term e-skills agenda “e-skills for the 21st Century” and the “Grand Coalition for Digital Jobs”, of the EU.

In line with the EU “A New Skills Agenda for Europe”, the Joint Research Centre (JRC) of the European Commission on behalf of the Directorate General for Employment, Social Affairs and Inclusion (DG EMPL) has developed the EntreComp: Entrepreneurship Competence Framework in 2016 (Bacigalupo et al., 2016). The framework aims to build consensus around a common understanding of **entrepreneurship competence** by defining 3 competence areas, a list of 15 competences, 442 learning outcomes and 8 proficiency levels, which current and future initiatives can refer to.

Moreover, following the 2018 updated Recommendation on Key Competences for Lifelong Learning¹, the Joint Research Center (JRC) in collaboration with the DG EAC of the EU, developed the LifeComp framework, which is a conceptual framework for the “Personal, Social and Learning to Learn” key competences. LifeComp (Sala et al., 2020) is made up of three intertwined competence areas: “Personal”, “Social”, and “Learning to Learn”. *LifeComp* regards “Personal, Social, and Learning to Learn” competences as ones which apply to all spheres of life (**Life Competences**), and which can be acquired through formal, informal, and non-formal education.

Last, **green competences** are a great part of the modern lighting professionals’ skills portfolio, due to the close connection of the lighting / construction and the environmental sector. Although there is not an EU-originated and widely accepted green skills framework, the research revealed various initiatives from the domain related to green skills, and in some cases, in relation to the lighting sector. These originate mainly from the European Construction Sector Observatory (ECSO) analytical reports, the Lighting Europe Strategic Roadmap 2025 of the European Lighting Industry, the Lighting Europe Position Paper on the Roadmap on a Circular Economy Action Plan (January 2020), and the Cedefop’s report on Skills for Green Jobs (2018).

As detailed in the ECOSLIGHT Methodology (R3.2), a set of competences was identified as “common” for the four different VET curricula; these competences are proven as essential for the four different job role profiles, therefore they were delivered to all through a MOOC (Massive Open Online Course). This course includes 22 competences, originating from all the above categories. Next, a specialization course for each different job role profile will be implemented including online, face-to-face and work based learning. Obviously, there will be common competences for more than one VET curricula, with the difference among them found mainly in the duration (learning equivalent) and the practical assignments. Both the MOOC and each specialization course form together a VET curricula for the respective Job Role Profile.

¹ https://ec.europa.eu/education/education-in-the-eu/council-recommendation-on-key-competences-for-lifelong-learning_en

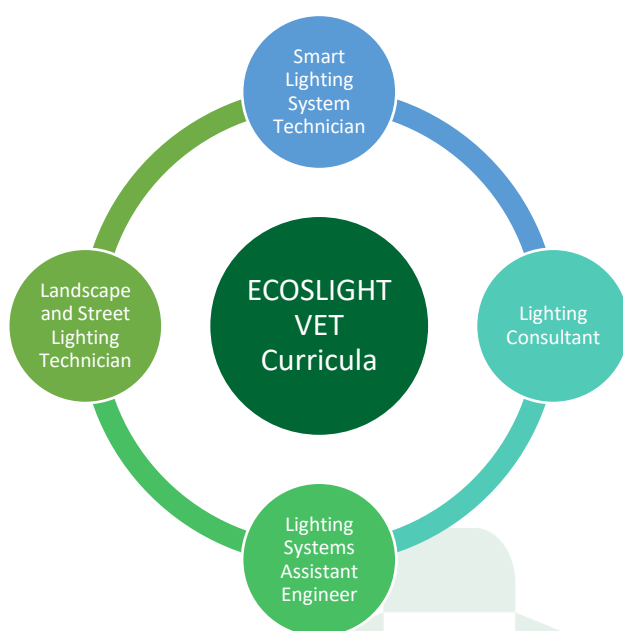


Figure 1: The selected ECOSLIGHT profiles for creating VET curricula

In the following chapter the reader may find the analytical Job Role Profiles selected for the ECOSLIGHT professional development activities.

2 Smart Lighting System Technician

2.1 Job role profile

Job Role Profile main characteristics			
Job Title:	SMART LIGHTING SYSTEMS TECHNICIAN		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Senior Professional <input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician		
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background) <input type="checkbox"/> Lighting designers (artistic background) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff		
Related profiles / groups of tasks	<input type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists <input type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers		
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input type="checkbox"/> Lighting technician (3435.12) <input type="checkbox"/> Ground lighting officer (7412.4) <input type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4) <input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input checked="" type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input checked="" type="checkbox"/> ICT technician (3512.4)		
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Exploit the potential of digital technologies. • Good Autocad, Dialux etc. Knowledge • Basic electronic knowledge (lighting technology 90% LED technology) • Solid knowledge of lighting and control technology • Digital sensitivity and existing IoT affinity • Prompt and timely delivery of consistently high-quality products and services. • Understand and transform the client's needs and the building features into the lighting design solution with respect to the current legal and technical regulations, and functional to the target space. • Assimilation of new technologies • Constant professional training and periodical updates regarding new technologies (smart technologies, digital solutions - home automation) 		

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	<p>connected systems), technical regulations and market trends.</p> <ul style="list-style-type: none"> • Technical solutions (lighting sources), smart solutions, home automations, digitalisation, administrative/certifications aspects. • Increase the knowledge of administrative regulations, especially if he/she collaborates with public bodies, and techniques: certifications, new technological solutions (LED, smart solutions, IOT, etc).
Technical/Preferred Skill Requirements:	
Lighting Competences	
<ul style="list-style-type: none"> • Lighting design and solving technical problems • Indoor lighting for buildings and artificial lighting / Daylight integration • Light for outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road lighting safety and security • Lighting system and components technologies including smart Lighting (indoor and outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy efficiency and Lighting performance • Lighting policy, regulation, energy labeling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences	
Basic digital competences (DigComp) <ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Advanced digital competences (e-CF) <ul style="list-style-type: none"> • A.4 Product/service planning • A.6 Application design • A.9 Innovating • B.1 Application development • B.4 Solution deployment • C.1 User support • D.3 Education and training provision • E.3 Risk management
Entrepreneurial Competences (EntreComp)	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.4 Financial and economic literacy • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience 	
Green Competences	
<ul style="list-style-type: none"> • Understand and promote the value of sustainable lighting • Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards • Understand the new sustainable lighting techniques applied to sustainable lighting • Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies • Understand sustainable building certification systems in the lighting sector • Understand the use of Environmental and Energy Labeling 	

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<ul style="list-style-type: none"> • Understand the selection criteria of lighting services / systems and products in terms of sustainability • Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes • Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases • Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process
Life Competences (LifeComp)
<ul style="list-style-type: none"> • Flexibility • Empathy • Communication • Collaboration • Growth mindset • Critical thinking • Managing learning
Job description:
Key Tasks and Responsibilities:
<p>The Smart Lighting Systems Technician is an emerging profile, horizontal in a degree, which can be employed in indoor and outside; the proliferation of ICT technologies, sensors, and the IoT overall, has created the need of a job role profile capable of enhancing lighting tasks with smart lighting. This role can and should be at the level of technician and not upper, as the expertise and R&D come from IT professionals.</p> <p>A Smart Lighting Systems Technician is a hybrid technical expert on IT smart solutions and lighting that should be able to:</p> <ul style="list-style-type: none"> • Analyze the lighting project data. • Determine information system requirements and define project objectives. • Apply software development process, development environments, tools and techniques. • Make recommendations for necessary IT system components e.g. hardware, software and networking systems. • Design, implement and deploy new smart lighting services. • Operate IT systems and services in relation to lighting. • Provide support and training to various types of users.
Key Performance Indicators (KPIs)
<ul style="list-style-type: none"> • Number of smart lighting projects successfully completed with a certain timeline • Positive review by his/her superiors
Additional information
<ul style="list-style-type: none"> • Not regulated profession according to the Directive 2005/36/EC²

Table 1: Smart Lighting Systems Technician Job Role Profile

² <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

2.2 Competences

Smart Lighting Systems Technician VET Curriculum				
#	Competence Title	Course delivered	Type of Competence	Hours
1	Lighting Design and solving technical problems	Specialization	Lighting	7
2	Indoor Lighting for Buildings and Artificial Lighting	MOOC	Lighting	4
3	Light for Outdoor installations	MOOC	Lighting	4
4	Lighting system and components technologies including smart Lighting (indoor and outdoor)	MOOC	Lighting	5
5	Light influence on human health, well-being and working performance (Lighting Ergonomics)	MOOC	Lighting	4
6	Energy Efficiency and Lighting performance	MOOC	Lighting	5
7	Lighting policy, regulation, energy labeling	Specialization	Lighting	6
8	Economic models related to lighting	Specialization	Lighting	7
9	Environmental impact of lighting	Specialization	Lighting	7
10	Evaluating data, information and digital content	MOOC	Digital (DigComp)	3
11	Collaborating through digital technologies	MOOC	Digital (DigComp)	3
12	Integrating and re-elaborating digital content	SPEC	Digital (DigComp)	5
13	Protecting personal data and privacy	MOOC	Digital (DigComp)	3
14	Solving technical problems	Specialization	Digital (DigComp)	5
15	Identifying needs and technological responses	Specialization	Digital (DigComp)	5
16	Product/service planning	Specialization	Digital (e-CF)	7
17	Application design	Specialization	Digital (e-CF)	7
18	Innovating	Specialization	Digital (e-CF)	7
19	Application development	Specialization	Digital (e-CF)	7
20	Solution deployment	Specialization	Digital (e-CF)	7
21	User support	Specialization	Digital (e-CF)	7
22	Education and training provision	Specialization	Digital (e-CF)	7
23	Risk management	Specialization	Digital (e-CF)	7
24	Understand and promote the value of sustainable lighting	MOOC	Green	5
25	Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards	MOOC	Green	4
26	Understand the new sustainable lighting techniques applied to sustainable lighting	MOOC	Green	4
27	Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies	Specialization	Green	7
28	Understand sustainable building certification systems in the lighting sector	Specialization	Green	7

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29	Understand the use of Environmental and Energy Labeling	Specialization	Green	7
30	Understand the selection criteria of lighting services / systems and products in terms of sustainability	MOOC	Green	4
31	Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes	MOOC	Green	5
32	Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases	Specialization	Green	7
33	Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process	Specialization	Green	7
34	Spotting opportunities	MOOC	Entrepreneurship (EntreComp)	3
35	Creativity	MOOC	Entrepreneurship (EntreComp)	3
36	Vision	MOOC	Entrepreneurship (EntreComp)	3
37	Valuing ideas	MOOC	Entrepreneurship (EntreComp)	3
38	Ethical and sustainable thinking	Specialization	Entrepreneurship (EntreComp)	5
39	Financial and economic literacy	Specialization	Entrepreneurship (EntreComp)	5
40	Taking the initiative	MOOC	Entrepreneurship (EntreComp)	3
41	Planning and management	MOOC	Entrepreneurship (EntreComp)	3
42	Coping with uncertainty, ambiguity and risk	MOOC	Entrepreneurship (EntreComp)	3
43	Working with others	Specialization	Entrepreneurship (EntreComp)	5
44	Learning through experience	Specialization	Entrepreneurship (EntreComp)	5
45	Flexibility	Specialization	Life (LifeComp)	5
46	Empathy	Specialization	Life (LifeComp)	5
47	Communication	Specialization	Life (LifeComp)	5
48	Collaboration	Specialization	Life (LifeComp)	5
49	Growth mindset	MOOC	Life (LifeComp)	3
50	Critical thinking	MOOC	Life (LifeComp)	3
51	Managing learning	Specialization	Life (LifeComp)	5
Total:				258

Table 2: Smart Lighting Systems Technician VET curriculum

3 Lighting Consultant

3.1 Job role profile

Job Role Profile main characteristics			
Job Title:	LIGHTING CONSULTANT		
Job Level	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional <input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician		
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background) <input type="checkbox"/> Lighting designers (artistic background) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff		
Related profiles / groups of tasks	<input checked="" type="checkbox"/> Light pollution and environmental impact of lighting specialists <input checked="" type="checkbox"/> Human-centric lighting specialists <input type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers		
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input checked="" type="checkbox"/> Lighting technician (3435.12) <input type="checkbox"/> Ground lighting officer (7412.4) <input type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4) <input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input checked="" type="checkbox"/> ICT consultant (2511.9) <input checked="" type="checkbox"/> ICT technician (3512.4)		
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable		Skills and knowledge required: <ul style="list-style-type: none"> • Having an EQF 5 degree (at least), preferably a Bachelor's degree in a technical field, i.e. in Architecture, Interior Design, Electrical Engineering or related field and a Master's degree in Lighting • Possessing experience in lighting sector/electrical services • Knowledge of lighting related policy, regulations, codes, standards etc. • Understanding of photometry and lighting technology namely: light sources, luminaire construction, maintenance, efficiency and optical characteristics • Knowledge of the physiology and psychology of the human visual system • Understanding of energy efficient & sustainable lighting design 	

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		<ul style="list-style-type: none"> • Strong verbal, written and graphic communication skills • Familiarity with technical writing and documentation • Proficiency in computer-aided design software, e.g. AutoCAD and lighting design software, e.g. Relux, Dialux, AGI32, Revit etc. • Knowledge of lighting control protocols for indoor and/or outdoor installations. • Knowledge of Adobe Creative Suite • Familiarity with customer relationship management software • Being proficient in Microsoft Office • Showing an understanding of lighting design
Technical/Preferred Skill Requirements:		
Lighting Competences		
<ul style="list-style-type: none"> • Lighting design and solving technical problems • Indoor lighting for buildings and artificial lighting / Daylight integration • Light for outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road lighting safety and security • Lighting system and components technologies including smart Lighting (indoor and outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy efficiency and Lighting performance • Lighting policy, regulation, energy labeling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 		
Digital and ICT Competences		
Basic digital competences (DigComp)		Basic digital competences (DigComp)
<ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 		<ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies
Entrepreneurial Competences (EntreComp)		
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.4 Financial and economic literacy • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience 		
Green Competences		
<ul style="list-style-type: none"> • Understand and promote the value of sustainable lighting • Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards • Understand the new sustainable lighting techniques applied to sustainable lighting • Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / 		

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<p>international policies</p> <ul style="list-style-type: none"> • Understand sustainable building certification systems in the lighting sector • Understand the use of Environmental and Energy Labeling • Understand the selection criteria of lighting services / systems and products in terms of sustainability • Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes • Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases • Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process
Life Competences (LifeComp)
<ul style="list-style-type: none"> • Flexibility • Empathy • Communication • Collaboration • Growth mindset • Critical thinking • Managing learning
Job description:
<p>Key Tasks and Responsibilities:</p> <p>[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]</p> <p>A lighting consultant, crafts ideas, creates designs and then transforms them into real-life solutions with a successful blend of creativity and pragmatism. For this type of professionals it is essential to closely collaborate hand-in-hand with architects, designers and creative teams. Some of the main missions of a lighting consultant are to,</p> <ul style="list-style-type: none"> • Provide expert advice and solutions for beautiful and functional lighting indoor or outdoor • Recommend sustainable lighting options that will create pleasant effects in every space • Convert lighting needs into a clear design with everything required for purchasing and installation • Design light that is functional, dynamic and enhances living spaces • Work in close collaboration with customers. <p>Moreover, a Lighting consultant knows how to respond to the market demand thanks to his/her (or its, in case of a company) technical, artistic, normative competences and know-how, as well as the ability to listen to the needs of customers, offering assistance with willingness, dedication and sensitivity.</p>
<p>Key Performance Indicators (KPIs):</p> <p>[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]</p> <ul style="list-style-type: none"> • -
Additional information
<ul style="list-style-type: none"> • Not regulated profession according to the Directive 2005/36/EC³

Table 3: Lighting Consultant Job Role Profile

³ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

3.2 Competences

Lighting Consultant VET Curriculum				
#	Competence Title	Course delivered	Type of Competence	Hours
1	Lighting Design and solving technical problems	Specialization	Lighting	6
2	Indoor Lighting for Buildings and Artificial Lighting	MOOC	Lighting	4
3	Light for Outdoor installations	MOOC	Lighting	4
4	Lighting system and components technologies including smart Lighting (indoor and outdoor)	MOOC	Lighting	5
5	Light influence on human health, well-being and working performance (Lighting Ergonomics)	MOOC	Lighting	4
6	Energy Efficiency and Lighting performance	MOOC	Lighting	5
7	Lighting policy, regulation, energy labeling	Specialization	Lighting	6
8	Economic models related to lighting	Specialization	Lighting	6
9	Environmental impact of lighting	Specialization	Lighting	7
10	Evaluating data, information and digital content	MOOC	Digital (DigComp)	3
11	Collaborating through digital technologies	MOOC	Digital (DigComp)	3
12	Integrating and re-elaborating digital content	SPEC	Digital (DigComp)	4
13	Protecting personal data and privacy	MOOC	Digital (DigComp)	3
14	Solving technical problems	Specialization	Digital (DigComp)	5
15	Identifying needs and technological responses	Specialization	Digital (DigComp)	4
16	Product/service planning	Specialization	Digital (e-CF)	6
17	Application design	Specialization	Digital (e-CF)	6
18	Innovating	Specialization	Digital (e-CF)	6
19	Application development	Specialization	Digital (e-CF)	7
20	Solution deployment	Specialization	Digital (e-CF)	6
21	User support	Specialization	Digital (e-CF)	6
22	Education and training provision	Specialization	Digital (e-CF)	6
23	Risk management	Specialization	Digital (e-CF)	6
24	Understand and promote the value of sustainable lighting	MOOC	Green	5
25	Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards	MOOC	Green	4
26	Understand the new sustainable lighting techniques applied to sustainable lighting	MOOC	Green	4
27	Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies	Specialization	Green	6
28	Understand sustainable building certification systems in the lighting sector	Specialization	Green	6

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29	Understand the use of Environmental and Energy Labeling	Specialization	Green	6
30	Understand the selection criteria of lighting services / systems and products in terms of sustainability	MOOC	Green	4
31	Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes	MOOC	Green	5
32	Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases	Specialization	Green	6
33	Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process	Specialization	Green	6
34	Spotting opportunities	MOOC	Entrepreneurship (EntreComp)	3
35	Creativity	MOOC	Entrepreneurship (EntreComp)	3
36	Vision	MOOC	Entrepreneurship (EntreComp)	3
37	Valuing ideas	MOOC	Entrepreneurship (EntreComp)	3
38	Ethical and sustainable thinking	Specialization	Entrepreneurship (EntreComp)	5
39	Financial and economic literacy	Specialization	Entrepreneurship (EntreComp)	4
40	Taking the initiative	MOOC	Entrepreneurship (EntreComp)	3
41	Planning and management	MOOC	Entrepreneurship (EntreComp)	3
42	Coping with uncertainty, ambiguity and risk	MOOC	Entrepreneurship (EntreComp)	3
43	Working with others	Specialization	Entrepreneurship (EntreComp)	5
44	Learning through experience	Specialization	Entrepreneurship (EntreComp)	5
45	Flexibility	Specialization	Life (LifeComp)	4
46	Empathy	Specialization	Life (LifeComp)	4
47	Communication	Specialization	Life (LifeComp)	4
48	Collaboration	Specialization	Life (LifeComp)	4
49	Growth mindset	MOOC	Life (LifeComp)	3
50	Critical thinking	MOOC	Life (LifeComp)	3
51	Managing learning	Specialization	Life (LifeComp)	5
Total:				237

Table 4: Lighting Consultant VET curriculum

4 Lighting Systems Assistant Engineer

4.1 Job role profile

Job Role Profile main characteristics			
Job Title:	LIGHTING SYSTEMS ASSISTANT ENGINEER		
Job Level	<input type="checkbox"/> Manager <input checked="" type="checkbox"/> Senior Professional <input type="checkbox"/> Junior Professional <input checked="" type="checkbox"/> Technician		
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input type="checkbox"/> Lighting professionals (engineering background) <input type="checkbox"/> Lighting designers (artistic background) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Technical-commercial staff		
Related profiles / groups of tasks	<input checked="" type="checkbox"/> Light pollution and environmental impact of lighting specialists <input type="checkbox"/> Human-centric lighting specialists <input checked="" type="checkbox"/> Road lighting safety and lighting security specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers		
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input checked="" type="checkbox"/> Lighting technician (3435.12) <input checked="" type="checkbox"/> Ground lighting officer (7412.4) <input checked="" type="checkbox"/> Street lighting electrician (7413.1.3) <input checked="" type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> Photonics engineer (2149.10.1) <input type="checkbox"/> Design engineer (2149.2.4) <input type="checkbox"/> Lighting designer (3435.11) <input type="checkbox"/> Landscape architect (2162) <input type="checkbox"/> Theatre technician (3435.23) <input checked="" type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Interior designer (3432.1) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> ICT consultant (2511.9) <input checked="" type="checkbox"/> ICT technician (3512.4)		
Location:	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor <input checked="" type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input checked="" type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable		Skills and knowledge required: <ul style="list-style-type: none"> • Photometric knowledge (lux, lumens, candela, ...) • Project management • Basic knowledge of electricity, electronics, and optics • Knowledge of Autocad, Dialux, Photoshop software • Management of standards related to lighting and fixtures • It is also necessary to be patient, to be able to show good judgment and logic, and to be able to work in a team in order to exchange views and experiences as much as possible. • Knowledge of the different types of lighting, light sources, optics, electrical 	

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	<p>connections ...</p> <ul style="list-style-type: none"> • Staff management, site costs, completion time for the various works (mast installation, connection, adjustment, junction box, connection of a cabinet, etc.), the necessary equipment • Qualities : Organized, open to discussion, know how to make decisions
Technical/Preferred Skill Requirements:	
Lighting Competences	
<ul style="list-style-type: none"> • Lighting design and solving technical problems • Indoor lighting for buildings and artificial lighting / Daylight integration • Light for outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road lighting safety and security • Lighting system and components technologies including smart Lighting (indoor and outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy efficiency and Lighting performance • Lighting policy, regulation, energy labeling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences	
Basic digital competences (DigComp) <ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Basic digital competences (DigComp) <ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies
Entrepreneurial Competences (EntreComp)	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.4 Financial and economic literacy • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience 	
Green Competences	
<ul style="list-style-type: none"> • Understand and promote the value of sustainable lighting • Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards • Understand the new sustainable lighting techniques applied to sustainable lighting • Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies • Understand sustainable building certification systems in the lighting sector • Understand the use of Environmental and Energy Labeling • Understand the selection criteria of lighting services / systems and products in terms of sustainability • Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / 	

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remanufacture – recycle processes

- Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases
- Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process

Life Competences (LifeComp)

- Flexibility
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

An Assistant Lighting Systems Engineer is concerned with the optimization of complex processes, systems, or organizations by developing, improving and implementing integrated systems of people, money, knowledge, information and equipment applied to Lighting Systems and its components, supporting the work of the Lighting Systems Engineer. He/she contributes to fast realization of prototypes as well as effective product development, by applying deep engineering knowledge of the most relevant coding platforms and standards, in combination with proven Agile collaboration methods and test-driven development.

The job of the Assistant Lighting System Engineers is versatile and strongly depends on the company that will employ such professional. It can be found as:

- Assistant Research Engineer (EQF 5)

In all above cases, required skills and training level (from EQF level 5 and above degree) are similar, but the main difference is the required relevant experience.

An Assistant Lighting System Engineer should demonstrate a system approach to design and develop with the desire and curiosity to strive for continuous improvement. He/she needs a deep understanding of the first principles/engineering fundamentals that drive the requirements of lighting systems. Add to these expectations, a detailed understanding of the manufacturing, materials and processes utilized to produce your components as well as commercial and financial awareness

The main tasks that an Assistant Lighting Systems Engineer is dealing are:

- Developing and testing lighting components and modules for any kind of lighting
- Supporting the Development of functional requirements and specifications
- Supporting the preparation of prototypes of the new product concepts
- Preparing reports with test summary analyses
- Supporting the implementation of projects to release to production new/changed products, components and processes.
- Keeping abreast of technical developments in own field through literature, technical contacts, and industry competition analyses
- Working closely with support functions and the Lighting Systems Engineer
- Working within a matrix organization whilst delivering towards project-based goals set by the program management team

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of successfully completed lighting projects within a certain timeline

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<ul style="list-style-type: none"> Positive review of the projects by the Project Manager and the clients
Additional information
<ul style="list-style-type: none"> Not regulated profession according to the Directive 2005/36/EC⁴

Table 5: Lighting Systems Assistant Engineer Job Role Profile



⁴ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

4.2 Competences

Lighting Systems Assistant Engineer VET Curriculum				
#	Competence Title	Course delivered	Type of Competence	Hours
1	Lighting Design and solving technical problems	Specialization	Lighting	7
2	Indoor Lighting for Buildings and Artificial Lighting	MOOC	Lighting	4
3	Light for Outdoor installations	MOOC	Lighting	4
4	Lighting system and components technologies including smart Lighting (indoor and outdoor)	MOOC	Lighting	5
5	Light influence on human health, well-being and working performance (Lighting Ergonomics)	MOOC	Lighting	4
6	Energy Efficiency and Lighting performance	MOOC	Lighting	5
7	Lighting policy, regulation, energy labeling	Specialization	Lighting	6
8	Economic models related to lighting	Specialization	Lighting	6
9	Environmental impact of lighting	Specialization	Lighting	7
10	Evaluating data, information and digital content	MOOC	Digital (DigComp)	3
11	Collaborating through digital technologies	MOOC	Digital (DigComp)	3
12	Integrating and re-elaborating digital content	SPEC	Digital (DigComp)	4
13	Protecting personal data and privacy	MOOC	Digital (DigComp)	3
14	Solving technical problems	Specialization	Digital (DigComp)	5
15	Identifying needs and technological responses	Specialization	Digital (DigComp)	4
16	Product/service planning	Specialization	Digital (e-CF)	6
17	Application design	Specialization	Digital (e-CF)	6
18	Innovating	Specialization	Digital (e-CF)	6
19	Application development	Specialization	Digital (e-CF)	7
20	Solution deployment	Specialization	Digital (e-CF)	6
21	User support	Specialization	Digital (e-CF)	6
22	Education and training provision	Specialization	Digital (e-CF)	6
23	Risk management	Specialization	Digital (e-CF)	6
24	Understand and promote the value of sustainable lighting	MOOC	Green	5
25	Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards	MOOC	Green	4
26	Understand the new sustainable lighting techniques applied to sustainable lighting	MOOC	Green	4
27	Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies	Specialization	Green	6
28	Understand sustainable building certification systems in the lighting sector	Specialization	Green	6

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29	Understand the use of Environmental and Energy Labeling	Specialization	Green	6
30	Understand the selection criteria of lighting services / systems and products in terms of sustainability	MOOC	Green	4
31	Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes	MOOC	Green	5
32	Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases	Specialization	Green	6
33	Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process	Specialization	Green	7
34	Spotting opportunities	MOOC	Entrepreneurship (EntreComp)	3
35	Creativity	MOOC	Entrepreneurship (EntreComp)	3
36	Vision	MOOC	Entrepreneurship (EntreComp)	3
37	Valuing ideas	MOOC	Entrepreneurship (EntreComp)	3
38	Ethical and sustainable thinking	Specialization	Entrepreneurship (EntreComp)	5
39	Financial and economic literacy	Specialization	Entrepreneurship (EntreComp)	4
40	Taking the initiative	MOOC	Entrepreneurship (EntreComp)	3
41	Planning and management	MOOC	Entrepreneurship (EntreComp)	3
42	Coping with uncertainty, ambiguity and risk	MOOC	Entrepreneurship (EntreComp)	3
43	Working with others	Specialization	Entrepreneurship (EntreComp)	5
44	Learning through experience	Specialization	Entrepreneurship (EntreComp)	5
45	Flexibility	Specialization	Life (LifeComp)	4
46	Empathy	Specialization	Life (LifeComp)	5
47	Communication	Specialization	Life (LifeComp)	5
48	Collaboration	Specialization	Life (LifeComp)	5
49	Growth mindset	MOOC	Life (LifeComp)	3
50	Critical thinking	MOOC	Life (LifeComp)	3
51	Managing learning	Specialization	Life (LifeComp)	5
Total:				242

Table 6: Lighting Systems Assistant Engineer VET curriculum

5 Landscape and Street Lighting Technician

5.1 Job role profile

Job Role Profile main characteristics			
Job Title:	LANDSCAPE AND STREET LIGHTING TECHNICIAN		
Job Level	<input type="checkbox"/> Manager <input type="checkbox"/> Junior Professional <input type="checkbox"/> Senior Professional <input checked="" type="checkbox"/> Technician		
Type of Professional	<input type="checkbox"/> Manager <input type="checkbox"/> Lighting designers (artistic background) <input type="checkbox"/> R&D Engineers / scientists (MSc-level and above) <input checked="" type="checkbox"/> Lighting technicians, installers and associate professionals <input type="checkbox"/> Lighting professionals (engineering background) <input type="checkbox"/> Technical-commercial staff		
Related profiles / groups of tasks	<input checked="" type="checkbox"/> Light pollution and environmental impact of lighting specialists <input checked="" type="checkbox"/> Road lighting safety and lighting security specialists <input type="checkbox"/> Human-centric lighting specialists <input checked="" type="checkbox"/> Smart lighting system specialists <input type="checkbox"/> Lighting designers		
ESCO related profiles	<input type="checkbox"/> Lighting director (2166.4.4) <input type="checkbox"/> Lighting designer (3435.11) <input checked="" type="checkbox"/> Lighting technician (3435.12) <input checked="" type="checkbox"/> Landscape architect (2162) <input checked="" type="checkbox"/> Ground lighting officer (7412.4) <input type="checkbox"/> Theatre technician (3435.23) <input checked="" type="checkbox"/> Street lighting electrician (7413.1.3) <input type="checkbox"/> Technical director (2166.4.7) <input type="checkbox"/> Intelligent lighting engineer (3435.12.1) <input type="checkbox"/> Interior designer (3432.1) <input type="checkbox"/> Electromechanical engineer (2151.1.3) <input checked="" type="checkbox"/> Information and communication technology professionals (25) <input type="checkbox"/> Electrical engineer (2151.1) <input type="checkbox"/> ICT consultant (2511.9) <input type="checkbox"/> Photonics engineer (2149.10.1) <input checked="" type="checkbox"/> ICT technician (3512.4) <input type="checkbox"/> Design engineer (2149.2.4)		
Location:	<input type="checkbox"/> Indoor <input checked="" type="checkbox"/> Outdoor <input type="checkbox"/> Both	Travel Required:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Qualifications and Education Requirements:			
Expected Education level: <input type="checkbox"/> EQF 4 (=Upper secondary) <input checked="" type="checkbox"/> EQF 5 (=Diploma of HE) <input type="checkbox"/> EQF 6 (=BSc) <input type="checkbox"/> EQF 7 (= Masters) <input type="checkbox"/> EQF 8 (= PhD) <input type="checkbox"/> Not applicable	<ul style="list-style-type: none"> • Technical knowledge of lighting equipment • Basic electrical knowledge, e.g. wiring, testing, repairing etc. • Knowledge of lighting control protocols, e.g. DMX512 • Ability to use hand tools and power-driven machinery • Manual dexterity and a high level of physical fitness, stamina and agility • Knowledge of health and safety guidelines, regulations etc. • Attention to detail and creativity • Understanding of artistic concepts • Knowledge of lighting design, theatre and entertainment arts, live event technology regarding the operation of lighting systems may be required 		

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<ul style="list-style-type: none"> • Strong communication skills 	
Technical/Preferred Skill Requirements:	
Lighting Competences	
<ul style="list-style-type: none"> • Lighting design and solving technical problems • Indoor lighting for buildings and artificial lighting / Daylight integration • Light for outdoor installations (Cities, Stadiums, Airports, Tunnels, etc.) including Road lighting safety and security • Lighting system and components technologies including smart Lighting (indoor and outdoor) • Light influence on human health, well-being and working performances (Lighting Ergonomics) • Energy efficiency and Lighting performance • Lighting policy, regulation, energy labeling, procurement, incentives and planning • Economic models related lighting (Investment, funding models, micro-credits, costs evaluation, life cycle cost models, Light-as-Service) • Environmental impact of lighting (ecosystem, recycling, life cycle assessment) 	
Digital and ICT Competences	
Basic digital competences (DigComp) <ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies 	Basic digital competences (DigComp) <ul style="list-style-type: none"> • 1.2 Evaluating data, information and digital content • 2.4 Collaborating through digital technologies • 3.2 Integrating and re-elaborating digital content • 4.2 Protecting personal data and privacy • 5.1 Solving technical problems • 5.2 Identifying needs and technological responses • 5.3 Creatively using digital technologies
Entrepreneurial Competences (EntreComp)	
<ul style="list-style-type: none"> • 1.1 Spotting opportunities • 1.2 Creativity • 1.3 Vision • 1.4 Valuing ideas • 1.5 Ethical and sustainable thinking • 2.4 Financial and economic literacy • 3.1 Taking the initiative • 3.2 Planning and management • 3.3 Coping with uncertainty, ambiguity and risk • 3.4 Working with others • 3.5 Learning through experience 	
Green Competences	
<ul style="list-style-type: none"> • Understand and promote the value of sustainable lighting • Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards • Understand the new sustainable lighting techniques applied to sustainable lighting • Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies • Understand sustainable building certification systems in the lighting sector • Understand the use of Environmental and Energy Labeling • Understand the selection criteria of lighting services / systems and products in terms of sustainability • Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes • Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases • Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability 	

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criteria in the lighting design process

Life Competences (LifeComp)

- Flexibility
- Empathy
- Communication
- Collaboration
- Growth mindset
- Critical thinking
- Managing learning

Job description:

Key Tasks and Responsibilities:

[Type a description of the essential key tasks, responsibilities and activities a candidate can expect to assume in this position]

A Landscape and Street Lighting Technician is responsible for the preparation, installation, rigging, wiring, operation and maintenance of lighting systems in theatres, venues, concert halls, broadcasting studios, indoor and outdoor live events etc. He or she implements the lighting design according to a lighting designer's plan and instructions and produces the appropriate visual effects for an arts/entertainment event, show or any type of broadcasted production. His / her work is physically demanding requiring physical mobility, balance, strength and agility because heavy lifting and working at heights in order to install the lighting equipment are often required. The work requires ability to use hand tools and power-driven machinery, knowledge of health and safety requirements and collaboration with other professionals, e.g. lighting designers, sound technicians, the theatre director, production manager etc. so as to deliver the optimal result in any type of production.

Key tasks and responsibilities of the Landscape and Street Lighting Technician includes the following:

- Interpreting a lighting designer's plan
- Installing, wiring, rigging, focusing and operating necessary lighting equipment
- Programming lighting control consoles and auxiliary equipment before the show/event
- Choose and combine colours to achieve the desired effect
- Provide and distribute power around the set and support areas
- Operating manual and computer-controlled lighting systems and controls during a show/event
- Performing routine maintenance functions such as replacing damaged light fixtures, luminaire drivers, color filters, so as to ensure the safe operation of lighting equipment and prevent technical problems
- Maintenance and proper utilization of electrical tools and equipment
- Operating within current health and safety regulations especially when working at heights and installing equipment
- Uninstalling all equipment at the end of the broadcast or production and ensure its safe transport and/or storage
- Attending production meetings to establish lighting requirements for a production
- Conferring with the lighting designer or the director of photography and other staff so as to integrate their creative vision into the lighting design as well as with other departments, such as sound and camera, the floor manager and producer etc.
- Coordinating the equipment and the technical crew and train other crew members as required
- Conducting risk assessments and ensure health and safety with regards to lighting
- Providing advice on the lighting budget and on the purchase of equipment
- Keeping abreast of the advances in technologies and techniques in the industry.

Key Performance Indicators (KPIs):

[Key performance indicator (KPI) is a quantifiable metric that reflects how well a business is achieving its stated goals and objectives]

- Number of lighting systems successfully installed in a production set

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<ul style="list-style-type: none"> • Positive review by his/her superiors
Additional information
<ul style="list-style-type: none"> • Not regulated profession according to the Directive 2005/36/EC⁵

Table 7: Landscape and Street Lighting Technician Job Role Profile



⁵ <https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?newlang=en>

5.2 Competences

Landscape and Street Lighting Technician VET Curriculum				
#	Competence Title	Course delivered	Type of Competence	Hours
1	Lighting Design and solving technical problems	Specialization	Lighting	7
2	Indoor Lighting for Buildings and Artificial Lighting	MOOC	Lighting	4
3	Light for Outdoor installations	MOOC	Lighting	4
4	Lighting system and components technologies including smart Lighting (indoor and outdoor)	MOOC	Lighting	5
5	Light influence on human health, well-being and working performance (Lighting Ergonomics)	MOOC	Lighting	4
6	Energy Efficiency and Lighting performance	MOOC	Lighting	5
7	Lighting policy, regulation, energy labeling	Specialization	Lighting	6
8	Economic models related to lighting	Specialization	Lighting	6
9	Environmental impact of lighting	Specialization	Lighting	7
10	Evaluating data, information and digital content	MOOC	Digital (DigComp)	3
11	Collaborating through digital technologies	MOOC	Digital (DigComp)	3
12	Integrating and re-elaborating digital content	SPEC	Digital (DigComp)	4
13	Protecting personal data and privacy	MOOC	Digital (DigComp)	3
14	Solving technical problems	Specialization	Digital (DigComp)	5
15	Identifying needs and technological responses	Specialization	Digital (DigComp)	5
16	Product/service planning	Specialization	Digital (e-CF)	6
17	Application design	Specialization	Digital (e-CF)	6
18	Innovating	Specialization	Digital (e-CF)	6
19	Application development	Specialization	Digital (e-CF)	7
20	Solution deployment	Specialization	Digital (e-CF)	6
21	User support	Specialization	Digital (e-CF)	6
22	Education and training provision	Specialization	Digital (e-CF)	6
23	Risk management	Specialization	Digital (e-CF)	6
24	Understand and promote the value of sustainable lighting	MOOC	Green	5
25	Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards	MOOC	Green	4
26	Understand the new sustainable lighting techniques applied to sustainable lighting	MOOC	Green	4
27	Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies	Specialization	Green	6
28	Understand sustainable building certification systems in the lighting sector	Specialization	Green	6

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29	Understand the use of Environmental and Energy Labeling	Specialization	Green	6
30	Understand the selection criteria of lighting services / systems and products in terms of sustainability	MOOC	Green	4
31	Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes	MOOC	Green	5
32	Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases	Specialization	Green	6
33	Understand the new sustainable / green trends in lighting and how to integrate the environmental / sustainability criteria in the lighting design process	Specialization	Green	7
34	Spotting opportunities	MOOC	Entrepreneurship (EntreComp)	3
35	Creativity	MOOC	Entrepreneurship (EntreComp)	3
36	Vision	MOOC	Entrepreneurship (EntreComp)	3
37	Valuing ideas	MOOC	Entrepreneurship (EntreComp)	3
38	Ethical and sustainable thinking	Specialization	Entrepreneurship (EntreComp)	5
39	Financial and economic literacy	Specialization	Entrepreneurship (EntreComp)	4
40	Taking the initiative	MOOC	Entrepreneurship (EntreComp)	3
41	Planning and management	MOOC	Entrepreneurship (EntreComp)	3
42	Coping with uncertainty, ambiguity and risk	MOOC	Entrepreneurship (EntreComp)	3
43	Working with others	Specialization	Entrepreneurship (EntreComp)	5
44	Learning through experience	Specialization	Entrepreneurship (EntreComp)	5
45	Flexibility	Specialization	Life (LifeComp)	4
46	Empathy	Specialization	Life (LifeComp)	5
47	Communication	Specialization	Life (LifeComp)	5
48	Collaboration	Specialization	Life (LifeComp)	5
49	Growth mindset	MOOC	Life (LifeComp)	3
50	Critical thinking	MOOC	Life (LifeComp)	3
51	Managing learning	Specialization	Life (LifeComp)	5
Total:				243

Table 8: Landscape and Street Lighting Technician VET curriculum

6 References and further readings

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- LightingEurope (2016). Strategic Roadmap 2025 of the European Lighting Industry.
- LightingEurope (2020). LightingEurope position paper on the roadmap on a circular economy action plan.
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7 Appendix: List of competences

7.1 Lighting competences

Lighting Competences		
#	Competence Title	Course delivered
1	Lighting Design and solving technical problems Design of architectural lighting, synthesis of light and color, effects of lighting on humans. Design and working with light. Lighting design techniques to produce conceptual lighting designs and luminaire product designs. Lighting simulations with artificial lighting. Compliance with lighting standards. Configuring lighting controls techniques. Human Centric Lighting, definitions, entrainment, metrics and calculations.	Specialization
2	Indoor Lighting for Buildings and Artificial Lighting / Daylight integration Daylight and artificial lighting in indoor spaces. Visual ergonomics, performance and sustainability. Design, planning and presentation techniques. Integration of lighting with building structure and form, lighting controls. Daylight guidelines for overall building design. Daylight design strategies for external openings. Lighting simulations with artificial lighting and daylight. Compliance with lighting standards, daylight metrics and regulations. Human Centric Lighting, definitions, entrainment, metrics and calculations.	MOOC
3	Light for Outdoor installations Relation between light and outdoor environments, mainly in urban contexts. LED Landscape Lighting Installations. Improve the aesthetics of landscape lighting installations. Definition of functional and architectural lighting. Introducing light masterplan. Light pollution. Guidelines for counter fighting light pollution. Compliance with lighting standards concerning sports facilities, parks, roads, parking lots, commercial areas, landscapes. Definition of protected areas.	MOOC
4	Lighting system and components technologies including smart Lighting (indoor and outdoor) Lighting techniques, applications and compilation of integrated lighting studies. Artificial light sources and lighting control technology. Smart technologies for indoor and outdoor lighting. LED fixtures. Render lighting simulations. Compliance with lighting standards concerning luminaires and communication. Lighting control protocols. Communication protocols between luminaires, wireless or with cables.	MOOC
5	Light influence on human health, well-being and working performance (Lighting Ergonomics) Relationship between light and humans, mediated by the physical space. Rules of rational lighting and use of regulations and standards. Improving visual comfort. Human Centric Lighting, definitions, entrainment, metrics and calculations. Blue light hazards. Temporal light modulation, Flicker Index, stroboscopic visibility measure, phantom array. Human visual perception, neurobiology, and performance. Compliance with lighting standards concerning luminaires and test reports. lighting benefit metrics, reduced visual capacity as the age advances	MOOC
6	Energy Efficiency and Lighting performance Energy optimization of lighting projects, costs and benefits. Definitions of energy indexes. Lighting Output Ratio, Utilance, Luminous efficiency and efficacy. Correlated Color Temperature (CCT), Dimming techniques, Task lighting design, General lighting index, Task lighting index. EU energy directives for lighting projects. Compliance with energy related standards. Introducing the role of lighting in Zero Energy Buildings.	MOOC
7	Lighting policy, regulation, energy labeling EU energy directives for lighting projects. Compliance with energy related standards. Introducing the role of lighting in Zero Energy Buildings. Compliance with lighting standards concerning luminaires and test reports.	Specialization
8	Economic models related to lighting Net value model, Return of investment model. ESCO, Energy Saving Companies and corresponding	Specialization

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	Economic models based for municipalities. Methods for validation of lighting economic results and compliance with lighting standards (luminance, illuminance, electrical measurements etc)	
9	Environmental impact of lighting New directions in energy and environmental responsibility. Definition of functional and architectural exterior lighting. Introducing light masterplan. Light pollution. Guidelines for counter fighting light pollution. Compliance with lighting standards concerning sports facilities, parks, roads, parking lots, commercial areas, landscapes. Definition of protected areas.	Specialization

Table 9: List of Lighting competences and descriptions



7.2 Basic digital competences (DigComp)

Basic Digital Competences		
#	Competence Title	Course delivered
1	Evaluating data, information and digital content Analyze, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. Analyze, interpret and critically evaluate the data, information and digital content.	MOOC
2	Collaborating through digital technologies Use digital tools and technologies for collaborative processes, and for co-construction and co-creation of data, resources and knowledge.	MOOC
3	Integrating and re-elaborating digital content Modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge.	SPEC
4	Protecting personal data and privacy Establish and maintain positive business relationships between stakeholders (internal or external) deploying and complying with organisational processes. Maintain regular communication with customer / partner / supplier, and address needs through empathy with their environment and managing supply chain communications. Ensure that stakeholder needs, concerns or complaints are understood and addressed in accordance with organisational policy. Protect personal data and privacy in digital environments. Understand how to use and share personally identifiable information while being able to protect one and others from damages. Understand that digital services use a "Privacy policy" to inform how personal data is used.	MOOC
5	Solving technical problems Identify technical problems when operating devices and using digital environments, and solve them (from trouble-shooting to solving more complex problems).	Specialization
6	Identifying needs and technological responses Understand where one's own digital competence needs to be improved or updated. Support others with their digital competence development. Seek opportunities for self-development and keep up-to-date with the digital evolution.	Specialization

Table 10: List of basic digital competences and descriptions

7.3 Advanced digital competences (e-CF)

Advanced Digital Competences		
#	Competence Title	Course delivered
1	Product/service planning Analyses and defines current and target status. Estimates cost effectiveness, points of risk, opportunities, strengths and weaknesses, with a critical approach. Creates structured plans; establishes time scales and milestones, ensuring optimisation of activities and resources. Manages change requests. Defines delivery quantity and provides an overview of additional documentation requirements. Specifies correct handling of products, including legal issues, in accordance with current regulations.	Specialization
2	Application design Analyze, specify, update and make available a model to implement applications in accordance with IS policy and user / customer needs, in the lighting era. Select appropriate technical options for application design, optimizing the balance between cost and quality. Design data structures and builds system structure models according to analysis results through modeling languages. Ensure that all aspects take account of interoperability, usability and security. Identify a common reference framework to validate the models with representative users, based upon development models (e.g. iterative approach).	Specialization
3	Innovating Devise creative solutions for the provision of new concepts, ideas, products or services. Deploy novel and open thinking to envision exploitation of technological advances to address business / society needs or research direction.	Specialization
4	Application development Interpret the application design to develop a suitable application in accordance with customer needs in the lighting sector. Adapt existing solutions by e.g. porting an application to another operating system. Code, debug, test and document and communicates product development stages. Select appropriate technical options for development such as reusing, improving or reconfiguration of existing components. Optimize efficiency, cost and quality. Validate results with user representatives, integrates and commissions the overall solution.	Specialization
5	Solution deployment Following predefined general standards of practice carry out planned necessary interventions to implement solution, including installing, upgrading or decommissioning. Configure hardware, software or network to ensure interoperability of system components and debug any resultant faults or incompatibilities. Engage additional specialist resources if required, such as third party network providers. Formally hand over fully operational solution to user and complete documentation recording all relevant information, including equipment addressees, configuration and performance data.	Specialization
6	User support Respond to user requests and issues, recording relevant information. Assure resolution or escalates incidents and optimize system performance in accordance with predefined service level agreements (SLAs). Understand how to monitor solution outcome and resultant customer satisfaction.	Specialization
7	Education and training provision Define and implement ICT training policy to address organisational skill needs and gaps. Structure, organize and schedule training programmes and evaluate training quality through a feedback process and implement continuous improvement. Adapt training plans to address changing demand.	Specialization
8	Risk management Implement the management of risk across information systems through the application of the enterprise defined risk management policy and procedure. Assess risk to the organisation's business, including web, cloud and mobile resources. Document potential risk and containment plans.	Specialization

Table 11: List of advanced digital competences and descriptions

7.4 Green competences

Green Competences		
#	Competence Title	Course delivered
1	Understand and promote the value of sustainable lighting Energy saving, counter fighting light pollution. Use of energy indexes. Lighting Output Ratio, Utilance, Luminous efficiency and efficacy etc	MOOC
2	Understand the sustainable assessment of lighting systems and solutions: purposes, methodologies, standards Method steps for performing a sustainable lighting design. Set technological requirements such as luminous efficiency in accordance the proper emitting spectrum. Avoiding blue light for exterior (Light Pollution). Use of white tuning techniques for interior (Human Centric Lighting – Entrainment of the human circadian system).	MOOC
3	Understand the new sustainable lighting techniques applied to sustainable lighting Interior: Definition of Human Centric Lighting – Entrainment new metrics and application Exterior: Definition of Light pollution new metrics and applications for counter fighting	MOOC
4	Understand the types and principles of the basic Environmental and Energy Labeling schemes and national / international policies Introducing and identifying principles of the basic Environmental and Energy Labeling schemes and national / international policies. Recognize the most beneficial and extract new Environmental and Energy indexes in order to be used as selection criteria for a sustainable product.	Specialization
5	Understand sustainable building certification systems in the lighting sector Introducing building certification systems and identifying the part of lighting in them. LEED, WELL ver2.0 etc. The points of each of the certification systems will be recognized and the corresponding knowledge will be provided. The methods for their certification will be provided.	Specialization
6	Understand the use of Environmental and Energy Labeling The EU directives will be analyzed. The corresponding knowledge will be provided. The methods for their certification will be provided. Each issue of the Environmental and Energy Labeling will be analyzed.	Specialization
7	Understand the selection criteria of lighting services / systems and products in terms of sustainability Introduce of multicriteria analyses decision tools (PROMETHE, ELECTRE etc). The decision criteria will be set according energy and sustainable indexes (Lighting Output Ratio, Utilance, Luminous efficiency and efficacy. Correlated Color Temperature (CCT), Dimming techniques, Task lighting design, General lighting index, Task lighting index etc)	MOOC
8	Understand the circular economy approach to lighting sector: maintenance – reuse / redistribute – refurbish / remanufacture – recycle processes The circular economy concerning lighting sector will be presented. Stages of raw material acquisition, manufacturing, packaging and distribution, use and end of life will be presented. All issues affecting every stage will be analyzed. Case studies will be presented. Correlation of the lighting products with substantial environmental impact in multiple areas, as for example in primary energy, toxicological effects, the effect on global warming, the level of environmental acidification.	MOOC
9	Understand the Life Cycle Costing (LCC) process, apply the LCC to build environment decision-making to lighting cases Evaluation of the environmental impacts throughout total life cycle, from the extraction and processing of raw materials, design, construction, transportation, distribution, use, recycling and re-use of materials, and last final disposal. Use of models that determine which lighting products are more environmentally friendly	Specialization
10	Understand the new sustainable / green trends in lighting and how to integrate the environmental /	Specialization

sustainability criteria in the lighting design process	
Understanding that lighting products are mainly studied during their use and not during their total life cycle. Introduction of Life Cycle Costing (LCC) process with specific indexes (recycle ratio, reuse ratio toxicological effects, the effect on global warming etc). Incorporation of these factors into the multicriteria analyses decision tools (PROMETHE, ELECTRE etc) in order to integrate the environmental / sustainability criteria in the lighting design process	

Table 12: List of green competences and descriptions



7.5 Entrepreneurship competences (EntreComp)

Entrepreneurship Competences		
#	Competence Title	Course delivered
1	Spotting opportunities Identify and seize opportunities to create value by exploring the social, cultural and economic landscape. Identify needs and challenges that need to be met. Establish new connections and bring together scattered elements of the landscape to create opportunities to create value.	MOOC
2	Creativity Develop several ideas and opportunities to create value, including better solutions to existing and new challenges. Explore and experiment with innovative approaches. Combine knowledge and resources to achieve valuable effects.	MOOC
3	Vision Imagine the future. Develop a vision to turn ideas into action. Visualize future scenarios to help guide effort and action.	MOOC
4	Valuing ideas Judge what value is in social, cultural and economic terms. Recognize the potential an idea has for creating value and identify suitable ways of making the most out of it.	MOOC
5	Ethical and sustainable thinking Assess the consequences of ideas that bring value and the effect of entrepreneurial action on the target community, the market, society and the environment. Reflect on how sustainable long-term social, cultural and economic goals are, and the course of action chosen. Act responsibly.	Specialization
6	Financial and economic literacy Estimate the cost of turning an idea into a value-creating activity. Plan, put in place and evaluate financial decisions over time. Manage financing to make sure my value-creating activity can last over the long term.	Specialization
7	Taking the initiative Initiate processes that create value. Take up challenges. Act and work independently to achieve goals, stick to intentions and carry out planned tasks.	MOOC
8	Planning and management Set long-, medium- and short-term goals. Define priorities and action plans. Adapt to unforeseen changes.	MOOC
9	Coping with uncertainty, ambiguity and risk Make decisions when the result of that decision is uncertain, when the information available is partial or ambiguous, or when there is a risk of unintended outcomes. Within the value-creating process, include structured ways of testing ideas and proto-types from the early stages, to reduce risks of failing. Handle fast-moving situations promptly and	MOOC
10	Working with others Work together and co-operate with others to develop ideas and turn them into action. Network. Solve conflicts and face up to competition positively when necessary.	Specialization
11	Learning through experience Use any initiative for value creation as a learning opportunity. Learn with others, including peers and mentors. Reflect and learn from both success and failure (your own and other people's).	Specialization

Table 13: List of entrepreneurship competences and descriptions

7.6 Life competences (LifeComp)

Life Competences		
#	Competence Title	Course delivered
1	Flexibility Readiness to review opinions and courses of action in the face of new evidence. Understanding and adopting new ideas, approaches, tools, and actions in response to changing contexts. Managing transitions in personal life, social participation, work and learning pathways, while making conscious choices and setting goals.	Specialization
2	Empathy Awareness of another person's emotions, experiences and values. Understanding another person's emotions and experiences, and the ability to proactively take their perspective. Responsiveness to another person's emotions and experiences, being conscious that group belonging influences one's attitude.	Specialization
3	Communication Awareness of the need for a variety of communication strategies, language registers, and tools that are adapted to context and content. Understanding and managing interactions and conversations in different socio-cultural contexts and domain-specific situations. Listening to others and engaging in conversations with confidence, assertiveness, clarity and reciprocity, both in personal and social contexts.	Specialization
4	Collaboration Intention to contribute to the common good and awareness that others may have different cultural affiliations, backgrounds, beliefs, values, opinions or personal circumstances. Understanding the importance of trust, respect for human dignity and equality, coping with conflicts and negotiating disagreements to build and sustain fair and respectful relationships. Fair sharing of tasks, resources and responsibility within a group taking into account its specific aim; eliciting the expression of different views and adopting a systemic approach.	Specialization
5	Growth mindset Awareness of and confidence in one's own and others' abilities to learn, improve and achieve with work and dedication. Understanding that learning is a lifelong process that requires openness, curiosity and determination. Reflecting on other people's feedback as well as on successful and unsuccessful experiences to continue developing one's potential.	MOOC
6	Critical thinking Awareness of potential biases in the data and one's personal limitations, while collecting valid and reliable information and ideas from diverse and reputable sources. Comparing, analysing, assessing, and synthesizing data, information, ideas, and media messages in order to draw logical conclusions. Developing creative ideas, synthesizing and combining concepts and information from different sources in view of solving problems.	MOOC
7	Managing learning Awareness of one's own learning interests, processes and preferred strategies, including learning needs and required support. Planning and implementing learning goals, strategies, resources and processes. Reflecting on and assessing purposes, processes and outcomes of learning and knowledge construction, establishing relationships across domains.	Specialization

Table 14: List of life competences and descriptions