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EQF (NQF) Level	

	STEMSOFT – U1	Technical skills
Aggregated Units of Learning Outcomes	STEMSOFT – U2	Metacognitive skills
	STEMSOFT – U3	Interpersonal skills
	STEMSOFT – U4	Intrapersonal skills
	STEMSOFT – U5	Citizenship skills
	STEMSOFT – U6	Entrepreneurial skills
	STEMSOFT – U7	Problem-solving skills

Cross-sectional Learning Outcomes		Disclaimer This is one of the actions of the STEMSOFT project which has been funded with support from the European Commission. This document reflects the views only of the project partners, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

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Generic Title of the Unit:	**U1 – Technical skills**	
Description:	Technical skills that comprise skills out of the standard engineering curriculum related to technical aspects.	
EQF/NQF Level:		

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Learning Outcomes

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STEMSOFT – U1 Technical skills	Descriptors	Training Module Code	Autonomy and responsibility	
			Knowledge	Skills
1.1 Core literacy functions			Is able to exercise core literary functions such as the reading of texts and the use of relevant documents, and expertly express oneself in writing.	
			Knows the core components of performing reading, writing, numeracy and ICT skills.	Uses reading, writing, numeracy and ICT skills in the daily operation
			Has the necessary overview of relevant sources for information gathering and interpretation	Explores, interprets and applies sources that is concerned with themes in the core subject areas
				Gains insight into problems on the basis of situation descriptions
				Undertakes literature searches and reviews using databases and other sources of information.

					Stays updated on professional developments by means of newspapers, professional journals and other relevant sources
				Knows how to structure professional documents	Produces text documents describing, explaining and reflecting the relevant subject area
1.2 Digital literacy				Is able to exploit software and information technology to accomplish complex work tasks.	
				Knows how to be safe in a digital environment	Protects own devices using appropriate anti-virus software etc.
					Is aware of current legislation related to the protection of personal data
					Initiates procedures to protect own personal data and privacy in a digital environment
				Is familiar with, and uses, digital communication tools.	Communicates effectively, collaborates and shares information through digital technologies.
					Engages in citizenship through digital technologies.

					Creates and manages a digital identity.
					Act responsibly and with respect for others when engaging in digital communication tools.
					Uses a wide range of features or options for a given software package.
					Creatively uses different software packages to produce the desired result.
1.3 Ethics in engineering				Is able to perform their work according to high ethical standards, by acting honourably, responsibly and lawfully and upholds the reputation, standing and dignity of the profession	
				Knows how to perform their work with accuracy and rigour	Always acts with care and competence and performs services only in areas of current competence
					Keeps their knowledge and skills up to date
					Ensures that they do not knowingly mislead or allow other to be misled about engineering matters
					Presents and reviews engineering evidence, theory and interpretation honestly, accurately and without bias
				Understands how to perform their work with a	Avoids deceptive acts, takes steps to prevent corrupt

				high standard of honesty and integrity	practices or professional misconduct, and declares conflicts of interest
					Rejects bribery and improper influence
					Acts for each employer or client in a reliable and trustworthy manner
					Explains how commercial, industrial, economic and social contexts affects their practice
				Understands how the principles of respecting life, the law and the public good have to be the centre of their professional actions	Identifies relevant legal requirements governing their activities, including data protection, intellectual property rights, contracts, product safety and liability issues, personnel issues and health & safety
					Ensures that all work is lawful and justified
					Minimises and justifies any adverse effect on society or on the natural environment from their work
					Takes due account of the limited availability of natural and human resources
					Holds paramount the health and safety of others

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Generic Title of the Unit:	**U2 – Metacognitive skills**	
Description:	Metacognitive skills are those related to the management and improvement of the cognitive process. They are related to the soft skills that help an individual to excel independently of their learning path.	
EQF/NQF Level:		

			Learning Outcomes		
STEMSOFT – U2 Metacognitive skills	Descriptors	Training Module Code	Autonomy and responsibility		
			Knowledge		Skills
2.1 The ability to learn independently			Is able to independently identify and address learning and developmental needs to enhance own performance.		
			Has self-awareness of own skills, competences and weaknesses.		Reviews own performance as a colleague.
			Knows how to learn from available opportunities.		Conducts self-assessment against standards for current position to identify learning needs.
					Takes advantage of learning opportunities provided (e.g., courses, feedback from supervisor or peers).
					Recognises the need for, and is able to, engage in independent life-long learning

				Actively follows current developments in science and technology
				Challenges stereotypes by actively working on changing one's perspective.
			Knows when to seek out learning opportunities.	Requests additional feedback to clarify learning needs.
				Seeks coaching in areas where techniques are rapidly evolving.
				Continually acquires new knowledge and applies this to improve job performance.
			Understands how to implement a self-directed development plan.	Gathers information from various sources to identify own strengths and weaknesses in current position.
				Identifies and plans learning targeted to specific developmental needs in current position.
				Monitors progress in meeting learning goals and updates the learning plan as needed.
2.2 The ability to locate and access information			Is able to locate and collect data from appropriate sources and analyse it to prepare meaningful and concise reports.	
			Knows and follows prescribed information gathering processes.	Identifies information needed based on relevant facts and issues underlying a particular problem.

				Identifies and consults the most useful of information to meet the requirement of the task.
				Obtains feedback on results.
				Follows prescribed methods of information collection.
			Knows how to process complex information from various sources.	Critically evaluates data sources for reliability.
				Knows when to seek expertise to discern and compare information or to clarify a problem.
				Maximises the potential of available technology to identify relevant information.
				Quickly processes large volumes of information discerning relevant and irrelevant information.
2.3 High-level thinking			Is able to evaluate information, apply it, and synthesise it to create new knowledge.	
			Knows how to evaluate information relevant to the pending work tasks.	Critically evaluates data sources for reliability.
				Depends on their comprehensive experience to filter out irrelevant information for the given task
			Understands how to synthesise available information.	Seeks expertise to discern and compare information or clarify a problem.

				Maximises the potential of available technology to identify relevant information.
				Quickly processes large volumes of information discerning relevant and irrelevant information.
			Knows how to apply synthesised information to create new knowledge relevant for work tasks.	Uses available information and knowledge to create new information relevant for the current work task.
				Uses new, creative approaches to create new knowledge.
				Collaborates well with others to create new knowledge.
				Makes informed judgements that include reflection on relevant social and ethical issues.
2.4 Critical and innovative thinking			Is able to break down complex information into fundamental parts, and assess and judge that information, and provide a fresh perspective to provide innovative solutions.	
			Knows how to split gathered complex information into fundamental subtasks.	Gathers and interprets relevant data and handles complex information within their field of study.
				Finds ways to split complex information into smaller, logical units
			Understands how to use relevant information to provide	Has a sense of purpose and an open mindset when facing a new problem.

				a new view/opinion to a problem.	Uses agility when trying out new ideas.
					Manages risks associated with new ideas.
			Knows how and when to modify current practices and processes.	Modifies a current practice or process to better meet needs.
				Approaches problems from different angles.
				Expands on the thinking or solutions presented by others.
			Understands how to identify new approaches.	Creates new ideas, solutions or approaches to challenges.
				Uses unconventional areas as sources of inspiration and insight into new options and solutions.
				Solves complex problems through developing new explanations and applications.

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Generic Title of the Unit:	U3 – Interpersonal skills	
Description:	Interpersonal skills are skills that improve one's capabilities to work with others. These skills are related to the ability of an individual to collaborate in a group, to communicate effectively, to understand the needs of others, to transfer knowledge to the real world, etc.	
EQF/NQF Level:		

Learning Outcomes

STEMSOFT – U3 Interpersonal skills	Descriptors	Training Module Code	Autonomy and responsibility	
			Knowledge	Skills
3.1 Communication	Verbal, non-verbal, interpersonal, active listening, communication context		Is able to present and substantiate professional themes and one's own work to small groups and large assemblies.	
			Knows about interpersonal communication, verbal and non-verbal communication.	Evaluates the communication context.
				Listens actively.
				Expresses personal ideas and peaks in a clear and concise manner.
				Presents information in a logical manner, using appropriate phrasing and vocabulary, both written and verbally.
			Knows basic presentation techniques and	Structures a message and reflect on, discusses and argues in relation to relevant themes and problems in the subject area.

				communication modalities.	Adapts communication to diverse audiences using a variety of different communication platforms, both online and offline.
					Effectively communicates information, ideas, problems and solutions to their target groups and different kinds of people at all organisational levels.
				Knows the positive effects of information sharing.	Shares information openly with colleagues.
					Structures internal flow of information.
3.2 Teamwork				Is able to work in team with motivation, reliability, punctuality and sense of responsibility in a flexible manner.	
				Recognises the benefits of working well and effectively together with others.	Engages fairly and honestly with others, while showing consideration and respect.
					Seeks assistance from others or other team members, and assist others when needed.
					Shares all relevant information with others.
				Understands when and how to proactively assist and involve others.	Initiates collaboration with others.
					Assumes additional responsibilities to facilitate team goals.

				Seeks input from others on matters that affect them.
				Functions effectively in a national and international context, as an individual and as a member of a team
				Cooperates well and effectively with engineers and other interdisciplinary actors
			Knows the necessity of fostering teamwork.	Participates in, and respect decisions taken as a group.
				Gives credit to, and acknowledges contributions of others.
				Ensures that all group members have an opportunity to contribute to the team and to the realisation of the common goals.
3.3 Empathy and compassion				Is able to understand other people's needs and to take that into consideration when making decisions.
			Understands the importance of showing empathy.	Understands the other person's situation, perceptions and feelings.
				Communicates the empathic understanding back to the other person.
			Understands the importance of	Shows compassion to team members who are in difficult situations.

			showing compassion.	Shows respect towards others who hold different ideas from their own
				Adapts the current strategy based on the needs of others.
			Understands the steps to take to develop emotional intelligence.	Compromises where necessary.
				Deals with non-assertive behaviours that hinders the value-creating activities (for example destructive attitudes, aggressive behaviour and so on).
3.4 Responsibility and the ability to resolve conflict			Is able to see when conflict resolution is needed, and has the necessary abilities to resolve the conflict.	
			Knows how to use communication as a tool in conflict resolution.	Is able to know when to interrupt, and when to stay quiet.
				Uses communication as a means of releasing bottled-up emotions.
				Focuses on shared goals instead of disagreements.
				Moves past a conflict without holding resentment or anger.
			Understands the importance of taking responsibility for	Faces the conflict head on, knowing is the best thing for both sides.

				resolving a conflict.	Seeks compromise to create a sustainable solution.
3.5 Leadership				Is able to guide others towards a common goal, by maximising the efforts of the team.	
					Contemplates on and defines their preferred leadership style
					Uses their skills in communication, teamwork, conflict resolution as well as empathy and sympathy to provide good leadership to their team
					Combines their interpersonal and entrepreneurial skills (defined throughout this matrix) to provide skilful and effective leadership to their team

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Generic Title of the Unit:		**U4 – Intrapersonal skills**			
Description:		Intrapersonal skills are those related to one's inner characteristics and also one's attitude towards things, ranging from creativity or adaptability to self-discipline or perseverance.			
EQF/NQF Level:					
Learning Outcomes					
STEMSOFT – U4 Intrapersonal skills	Descriptors	Training Module Code	Autonomy and responsibility		
			Knowledge	Skills	
4.1 Flexibility and adaptability			Is able to show flexibility and adaptability also when facing difficult situations.		
			Knows how to adapt in a modern work environment.	Adapts quickly to new work environments.	
				Manages stress and relaxation	
				Understands quickly new tasks and job requirements.	
			Shows flexibility in the work environment	Demonstrates flexibility when it comes to working with different tasks or people	
				Demonstrates flexibility when it comes to working longer days and/or at inconvenient hours	
4.2 Self-management and self-discipline			Is able to work in a responsible manner with self- and time-management. Is able to reflect in past experiences in order to improve own performance and complete tasks effectively.		

				Knows the principles of time management according to SMART principles: Specific, Measurable, Accurate, Realistic, Timely	Applies time management principles to a project operation.
					Organises their work independently.
				Understands the importance of emotional self-control in the workplace.	Communicates rationally with others when there is a disagreement.
					Sets temporarily aside personal wants in order to finish a task.
					Re-addresses the situation in order to persevere when faced with difficulties, challenges or changes.
				Knows how to seek opportunities for improvement.	Acknowledges areas where expectations about own performance or interpersonal interactions are not met.
					Provides plausible reasons for the lack of success, which may or may not include self.
					Positively accepts others' feedback.
				Understands the importance of taking responsibility.	Takes personal responsibility for outcomes, even when not all elements of a situation are within direct control.

				Resolves a problem, even if the problem did not arise as a consequence of the self's own actions.
				Demonstrates an awareness of appropriate codes of practice and industry standards.
				Demonstrates initiative and exercises personal responsibility.
4.3 Creativity			Is able to demonstrate creativity, and generate new, viable approaches and solutions.	
			Recognises the importance of creativity in relation to adaptability and resilience	Explores own creativity.
				Creatively does things differently through new practices and processes
				Evaluates constructively current practices and processes.
				Suggests improvements to current practices and processes
			Knows how and when to modify current practices and processes.	Modifies a current practice or process to better meet needs.
				Approaches tasks from different angles.
				Expands on the thinking or solutions presented by others.
			Understands how to identify new approaches.	Creates novel ideas, solutions or approaches to challenges.

					Uses unconventional areas as sources of inspiration and insight into new options and solutions.
					Solves complex problems through developing new explanations and applications
4.4 Perseverance and resilience				Is able to remain energised and focused in the face of change or strenuous demands.	
				Understands the importance of working effectively in standard situations.	Assesses own stress levels and uses stress management techniques to tackle this.
					Remains focused and productive in the face of standard work demands
					Shows flexibility and strives to meet objectives when working under changing or unclear conditions
				Knows how to work effectively in the face of ongoing or regular strenuous work demands.	Remains effective and retains perspective in the face of difficult or demanding situations (pervasive ambiguity, frequent change, high workloads).
					Views disruptions as challenges rather than threats.
4.5 Self-motivation				Is able to set goals and takes initiative to make things happen.	
				Understands the importance of being able to define realistic and attainable goals.	Undertakes a task or activity on their own.
					Works independently and interdependently without seeking ongoing reassurance (i.e., makes appropriate independent decisions).

			Understand how to take initiative to make things happen.	Tracks progress towards the achievement of goals.
				Demonstrates self-confidence when taking a decision.

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Generic Title of the Unit:	**U5 – Citizenship skills**
Description:	Citizenship value competences are based on knowledge of basic concepts and phenomena relating to individuals, groups, work organisations, society, economy and culture.
EQF/NQF Level:	

Learning Outcomes

STEMSOFT – U5 Citizenship skills	Descriptors	Training Module Code	Autonomy and responsibility	
			Knowledge	Skills
5.1 European citizenship values			Is able to engage in the European integration project, and understands both the common values and diversity within Europe	
			Has knowledge of the European integration project and the European common values	Finds and understands the values expressed in Article 2 of the European Union, and the Charter of Fundamental Rights of the European Union
			Understands the multi-cultural and socioeconomic dimensions of European societies	Is aware of the diversity and cultural and socio-economic identities in Europe, and how this contributes to a common European identity

				Is able to act as a global citizen and to understand important contemporary events	
5.2 Global awareness				Knows of important contemporary events across the world	Actively searches for relevant global news
					Stays updated on global contemporary events
				Understands the aims, values and policies of social and political movements, as well as of sustainable systems	Actively searches for and stays updated on current political and social news
					Follows debates on central political and social issues such as climate and demographic change at the global level and their underlying causes
					Critically analyses the main developments in national, European and world history
5.3 Cultural understanding and respect				Is able to actively build a value system that is flexible and open to other cultures. Recognises and respects that there can be more ways to achieve a goal, and actively supports and promotes diversity.	
				Understands how own biases, personal perspectives and attitudes impact own behaviour.	Acknowledges how own cultural influences and biases can affect own attitudes, beliefs and feelings towards others.
					Finds ways to minimise impact of own biases, personal perspectives and attitudes on actions and decisions.
					Recognises the impact of culture on thinking, feeling and acting.

					Seeks out opportunities to learn about cultures different from their own.
				Adapts behaviours based on an understanding of cultural diversity.	Adapts behaviours according to the cultural context.
					Facilitates open and transparent communication about cultural issues.
					Supports the development of cultural competence among individuals and in groups.
				Understands how respect for human rights is crucial for a democracy	Participates in democratic decision-making at either local, national or international level through political or social activism
					Supports gender equality and social cohesion, and promotion of culture of peace and non-violence
					Takes responsibility for the environment and supports sustainable lifestyles

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Generic Title of the Unit:	**U6 – Entrepreneurial skills**
Description:	Entrepreneurship as a skill is defined as the capacity to act upon opportunities and ideas to create value for others. The value created can be social, cultural, or financial. Entrepreneurship is a skill for life. Being creative or thinking about how to do things in new ways is equally relevant to progressing your career or coming up with new business ideas. Understanding how to put a plan into action and use finances wisely are relevant for your own life and for business planning in a small or medium-sized company (SME).
EQF/NQF Level:	

Learning Outcomes

STEMSOFT – U6 Entrepreneurial skills	Descriptors	Training Module Code	Autonomy and responsibility	
			Knowledge	Skills
6.1 Apply entrepreneurship and innovative improvements			Is able to recognize and analyse an opportunity, and then capture its value. Is able to apply improvements in optimising work processes.	
			Identifies the potential benefits of risk-taking.	Assesses the risk associated with an idea.
				Examines the benefits of taking risks, while also considering the consequences of failure.
				Takes a chance (starting a project, a business, etc.) knowing that the enterprise might not succeed.
			Knows how to apply improvements to	Applies improvements to increase project productivity.

				work processes in compliance with legal, regulatory, ethical and social requirements.	Functions in compliance with legal, regulatory, ethical and social requirements.
				Understands the importance of commitment to an idea, as long as it is viable.	Stands for an idea, despite rejection.
					Presents a possibly unpopular idea.
					Leaves an idea when presented with considerable proof of its unviability.
6.2 Adapt to change				Is able to adapt to changing operational conditions	
				Knows basic reactions to change.	Manages change in requirements.
					Uses creativity, imagination and innovation to adapt to change
					Can anticipate and include change during the value-creating process
6.3 Decision-making				Is able to solve problems by describing a situation, analysing the situation and choosing a successful path.	
				Knows how to create a good decision-making process	Defines the problem, challenge, or opportunity.
					Generates an array of possible solutions or responses, including others when needed.
					Evaluates the costs and benefits associated with each option.

				Thinks critically about the different options, and assesses the consequences of each outcome before deciding.
			Understands how to implement the chosen decision.	Selects a solution or response.
				Implements the option chosen, convincing others if needed.
				Assesses the impact of the decision and modifies the course of action if needed.
			Understands how having a strong moral compass and a sense of integrity is crucial when making important decisions.	Bases their decisions on whether the resulting action will be for the broader benefit of others.
				Shows compassion and respect for others in the decision-making process.
6.4 Planning and management			Is able to manage one's own and others' time efficiently and to organise, evaluate and adjust plans to reach goals, while ensuring optimal use of resources.	
			Knows how to manage one's own time	Identifies important tasks and complete them in order of priority.
				Plans the tasks needed to be done.
				Finishes all tasks in the allotted timeframe.
			Know how to manage a teams' time.	Plans other people's work according to a set timeframe.

				Follows up the tasks, and reallocate resources to ensure successful completion.
			Recognises what is required when organising own activities.	Organises own activities to accomplish pre-determined activities or procedures.
				Monitors the quality and timeliness of own work and adjust accordingly.
				Uses responsibly the resources at one's immediate disposal.
			Understands how to organise a variety of activities.	Identifies varied resources needed.
				Produces realistic, achievable and adjustable work plans (e.g., through breaking activities into smaller components to facilitate completion)
				Organises a team to maximise skill and competence output.
				Evaluates the extent to which objectives have been achieved.
6.5 Ideas and opportunities			Is able to use their imagination and abilities to identify opportunities for creating value.	
			Knows how to design value and to be innovative.	Creates (alone or with others) products or services that solve problems and needs.
				Develops and delivers value in stages, launching with the core features of one's own (or the team's) idea and progressively adding more.

					Describes how innovations diffuse in, and influence society, culture and the market.
					Describes different levels of innovation (for example incremental, breakthrough or transformational) and their role in value-creating activities.
				Knows how to think strategically.	Defines long-term goals.
					Matches short-term, mid-term and long-term goals to the vision for one's own (or team's) value-creating activity.
					Explains the role of a vision statement for strategic planning.
					Prepares a vision statement for value-creating activity that guides internal decision-making throughout the whole process of creating value.

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Generic Title of the Unit:		**U7 – Problem-solving skills**		
Description:		Problem-solving skills are those that help to identify the source of a problem and find a suitable and effective solution. These skills are related to the ability of an individual to motivate others, to communicate effectively, to plan and prioritize, and to see a project through to completion.		
EQF/NQF Level:				
Learning Outcomes				

STEMSOFT – U7 Problem-solving skills		Training Module Code	Autonomy and responsibility	
			Knowledge	Skills
7.1 Negotiation techniques			Is able to demonstrate good negotiation skills.	
			Knows effective negotiation techniques.	Collaborates with colleagues in order to survey and improve procedures, performance, new initiatives in the organising of work.
				Balances awareness and empathy.
			Knows how to manage expectations	Has a clear goal for the outcome of a negotiation
				Maintains a balance between being a firm and collaborative negotiator to achieve the best possible results
			Is able to identify problems and potential solutions, and implement the most	

				appropriate.	
7.2 Problem identification and solving				Knows how to identify advanced problems.	Identifies problems based on clear and fundamental factors.
					Describes the essence of a problem.
					Identifies the influencing factors of a problem.
					Organises and processes the information identified.
				Understands how to solve complex problems	Identifies links between related problems, while keeping distinct problems separate.
					Identifies optimal or alternative solutions to complex problems, based on a careful consideration of the available and applicable approaches, with their advantages and disadvantages.
					Implements the optimal solution after a careful consideration.
				Understands the use of applicable techniques, methods of analysis,	Realises complex engineering designs
					Conducts advanced investigations in their field of study

				design and investigation, and their limitations in their field of study	Applies relevant norms of engineering practice to solve complex problems
				Understands how to apply the relevant material, equipment and tools, and their limitations in their field of study	Uses the appropriate material, equipment and tools for solving complex problems
7.3 The ability to reflect on underlying factors				Is able to reflect on underlying factors, and make decisions related to problem-solving based on those reflections.	
				Knows how to identify one own strengths and weaknesses.	Teams up with others to compensate for weaknesses and add to the strengths.
					Finds and chooses opportunities to overcome weaknesses and to develop strengths.
					Reflects on one owns or the team's achievements and temporary failures as things develop so as to learn and improve the ability to create value.
				Knows how to cope with ambiguity, uncertainty and risk	Finds ways of making decisions when the information is incomplete.
					Demonstrates that one can make decisions by weighing up both the risks and the expected benefits of a value-creating activity.

				Outlines a risk management plan for guiding one owns or team's choices while developing value-creating activities.
				Uses their awareness of economic, organisational and managerial issues (such as project management, risk and change management) in the industrial and business context to cope with ambiguity, uncertainty and risk