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IO 01 - BBE COMPETENCES NAVIGATOR

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List of competences and skills

BioComp - List for competences and skills

Introduction

Dear reader,

Probably, you have filled in our online ranking list for BBE related competences and uploaded to the BioComp website. Thank you for your valuable contribution to our project BioComp. It aims to develop Bio-based competences and skills. Based on a big number of interviews in companies, we have developed a long-list of competences and skills. These are divided in three categories: personal, transversal and technical competences and skills.

In the ranking list, you only see competences. May-be you get interested in competences and you like to know more about it. On our website www.Biocompetences.eu you find more background information, including this document. It is about the connection between competences and skills.

List of competences and skills

I Personal competences

In this project, we consider personal competences as a combination of self-awareness (emotional self-aware, accurate self-assessment and self-confidence) and self-management (control of your emotions, having commitment and being conscientious). These competences are important to function in a certain job. Related to these competences are the social competences, with a focus on self-awareness and relation-management. Other documents also speak about 'soft skills' or 'emotional intelligence'.

Topics	Competences	Skills
Self-regulation	The ability to understand, activate, monitor, control and adapt emotions, thoughts, attention, behaviour and cognitive strategies.	Being able to remain calm and rational in most situations and exercise discipline when needed. People with self-control tend to think before they

		act because they are more aware of how they react or feel in most situations and how that impacts others.
Empathy	The ability to understand, vicariously experience and respond to another person's feelings, emotions and thoughts (emotional, cognitive and perspective taking).	Being able to put yourself into someone else's place, and see their perspective (Cognitive empathy, also known as 'perspective-taking).
Growth Mindset	Being motivated to reach higher levels of achievement by continuously learning new skills in order to move with a changing market. Essentially, it is being adaptable and willing to go above and beyond the soft and hard skills you already have.	To be able to grow and adapt to changes within your industry and the job market as a whole.
Wellbeing	Achieving a state of contentment, with low levels of distress, overall good physical and mental health, and good quality of life	Enjoy living morally and ethically, and value being able to be brave, self-controlled, generous, etc. Not for the external rewards and recognition, but because living in this way is the right thing to do and brings its own rewards.
Adaptability	The ability to be flexible and respond positively to a rapidly evolving environment, coming out the better for it (bouncing forward).	Having flexibility in handling change, being able to juggle multiple demands, and adapting to new situations with fresh ideas or innovative approaches.
Collaboration	Being part of a relational system in which two or more stakeholders pool together resources, ideas and actions to meet common goals that neither could meet individually – with shared commitment and ownership.	Being able to work effectively with others on a common task; taking actions which respect the needs and contributions of others; contributing to and accepting the consensus; negotiating a win-win solution to achieve the objectives of the team.
Communication	Using words, sounds, signs, or behaviours to express or exchange information, thoughts, ideas, feelings to someone else. It may be vocally (using voice), written (using printed or digital media such as books, magazines, websites or emails), visually (using logos, maps, charts or graphs) or non-verbally (using body language, gestures and the tone and pitch of voice).	The ability to communicate information accurately, clearly and as intended
Managing Learning	Knowledge of oneself (as learner, of strategies, tasks and context) and as regulation (applying it to plan, monitor and evaluate learning)	Being able to pursue and persist in learning, to organise one's own learning, including through effective management of time and information, both individually and in groups.
Critical Thinking	Skilful analysis and assessment of information, beliefs or knowledge, with ongoing reconstruction and improvement of one's thinking. It can bridge convergent (analytical) and divergent (creative) thinking	Being able to reflect on what a text says, what it describes and what it means in the context of your work field, by scrutinising the style and structure of the writing, the language used as well as the content.

II Transversal competences

Several competences and skills are transferable between professions. People also used to call "experience". In this list, they are described as transversal competences and skills.

Examples from transversal competences in our Navigator are digital competences and entrepreneurial competences.

For subjects such as quality assurance, marketing and management, these competences are essential. The combination of the right personal and transversal competences makes from a worker a good worker.

II.a Digital competences

Topics	Competences	Skills
Information and Data Literacy	Managing data, information and digital content: To organise, store and retrieve data, information, and content in digital environments. To organise and process them	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • organise information, data and content to be easily stored and retrieved. • organise information, data and content in a structured environment
Communication	Interacting through digital technologies: To interact through a variety of digital technologies and to understand appropriate digital communication	On my own and solving straightforward problems, I can: • perform well-defined and routine interactions with digital technologies, and • select well-defined and routine appropriate digital communication means for a given context.
Collaboration	Collaborating through digital technologies: To use digital tools and technologies for collaborative process, and for co-construction and co-creation of data.	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • select digital services in order to participate in society. • discuss appropriate digital technologies to empower myself and to participate in society as a citizen.

Safety	Protecting devices: To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security	On my own and solving straightforward problems, I can: • indicate well-defined and routine ways to protect my devices and digital content,
		differentiate well-defined and routine risks and threats in digital environments,
		select well-defined and routine safety and security measures.
		• indicate well-defined and routine ways to have due regard to reliability and privacy
Safety	Protecting personal data and privacy: To protect personal data and	On my own and solving straightforward problems, I can:
	privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself	explain well-defined and routine ways to protect my personal data and privacy in digital environments, and
	and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used.	• explain well-defined and routine ways to use and share personally identifiable information while protecting myself and others from damages.
		• indicate well-defined and routine privacy policy statements of how personal data is used in digital services.
Safety	Protecting the environment: To be aware of the environmental impact of digital technologies and their use.	On my own and solving straightforward problems, I can:
		• indicate well-defined and routine environmental impacts of digital technologies and their use.
Problem solving	Solving technical problems: To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems).	Independently, according to my own needs, and solving well-defined and non-routine problems, I can:
		differentiate technical problems when operating devices and using digital environments, and
		select solutions to them
Problem solving	Identifying needs and technological responses Please rate your ability: To assess needs and to identify, evaluate, select and use digital tools and possible technological responses and to solve	Independently, according to my own needs, and solving well-defined and non-routine problems, I can:
	them. To adjust and customise digital environments to personal needs	explain needs, and
	(e.g. accessibility).	• select digital tools and possible technological responses to solve those needs.
		• select ways to adjust and customise digital environments to personal needs.

Problem solving	Creatively using digital technology: To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments.	On my own and solving straightforward problems, I can: • select digital tools and technologies that can be used to create well-defined knowledge and well-defined innovative processes and products. • engage individually and collectively in some cognitive processing to understand and resolve well-defined and routine conceptual problems and problem situations in digital environments.
Problem solving	Identifying digital competence gaps: To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and to keep up-to-date with the digital evolution	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • discuss on where my digital competence needs to be improved or updated, • indicate how to support of others to develop their digital competence. • indicate where to seek opportunities for self-developments and to keep upto-date with the digital evolution
Use of Augmented Reality (AR)	To identify the benefit of AR technology and possibilities of use in training and creatively using AR technology in training situations.	

II.b Entrepreneurial competences

Topics	Competences	Skills
Ideas and Opportunities	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.	 On my own and together with my peers: I can explain what makes an opportunity to create value. I can identify opportunities to solve problems in alternative ways. I can explain that different groups may have different needs. I can tell the difference between contexts for creating value (for example, communities and informal networks, existing organisations, the market).

Ideas and Opportunities	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	 On my own and together with my peers: I can experiment with my skills and competences in situations that are new to me. I can experiment with different techniques to generate alternative solutions to problems, using available resources in an effective way. I can take part in group dynamics aimed at defining open-ended problems. I can identify the basic functions that a prototype should have to illustrate the value of my idea. I can tell the difference between types of innovations (for example, process versus product innovation and social innovation, incremental versus disruptive innovation).
Ideas and Opportunities	Valuing Ideas: Judge what value is in social, cultural and economic terms. Recognise the potential an idea has for creating value and identify suitable ways of making the most out of it.	On my own and together with my peers: I can tell the difference between social, cultural and economic value. I can tell the difference between types of licences that can be used to share ideas and protect rights.
Ideas and Opportunities	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.	 On my own and together with my peers: I can apply ethical thinking to consumption and production processes. I can identify practices that are not sustainable and their implications for the environment. I can identify the impact that taking up opportunities will have on me and my team, on the target group and on the surrounding community.
Resources	Mobilising resources: To get and manage the material, non-material and digital resources needed to turn ideas into action. Make the most of limited resources. Get and manage the competences needed at any stage, including technical, legal, tax and digital competences (for example through suitable partnerships, networking, outsourcing and crowdsourcing).	 Taking and sharing some responsibilities: I can get and manage the necessary resources to turn my idea into action. I use resources responsibly and efficiently (for example, energy, materials in the supply chain or manufacturing process, public spaces). I can use my time effectively to achieve my goals. I can find and list public and private services to support my value-creating activity (for example, incubator, social enterprise advisors, start-up angels, chamber of commerce).

Into Action	Taking the initiative: To initiate processes that creates value. Take up challenges. Act and work independently to achieve goals, stick to intentions and carry out planned tasks.	 Taking and sharing some responsibilities: I can take individual and group responsibility in value-creating activities. I am driven by the possibility of being able to initiate value-creating activities independently. I actively face challenges, solve problems and seize opportunities to create value.
Into Action	Working with others: To work together and cooperate with others to develop ideas and turn them into action. Network. Solve conflicts and face up to competition positively when necessary.	 Taking and sharing some responsibilities: I can value diversity as a possible source of ideas and opportunities I can face and solve conflicts. I can listen to my end users. I share the ownership of value-creating activities with the members of my team I can create a team of people who can work together in a value-creating activity. I can establish new relationships to get the support I need to turn ideas into action, including emotional support (for example, joining a mentor network)
Into Action	Learning through Experience: To 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).	 Taking and sharing some responsibilities: I can judge if and how I have achieved my goals, so that I can evaluate my performance and learn from it I am always looking for opportunities to improve my strengths and reduce or compensate for my weaknesses I can filter the feedback provided by others and keep the good from it.

III Technical competences

In this section, you can find a set of competences, related to three processes: Biogas, Food for packaging and Algae

III.a Biogas

Biogas technicians work in the derivation of gas from organic matter and produced as landfill gas or digested gas. They operate equipment in biogas plants, perform tests and maintenance tasks, and take action in the event of a failure.

Topics	Competences	Skills
operate biogas plant	Operate equipment, which treats energy crops, and waste from farms, called anaerobic digesters. Ensure the equipment functions correctly in the transformation of biomass to biogas, which is used for the generation of heat and electricity.	 I know about: The variety of plants, their cultivation and harvesting Biology and growing the plants Storage and processing of biomass for energy use
Composting of organic waste (Biomass)	Identifying needs and technological responses: to know the types of bio-waste, the recovery routes (composting, digestion, incineration)	I know: The variability of bio-waste the composition and ingredients their ways of utilization through chemical, thermal, and biochemical methods.
Composting of organic waste (Biomass)	Identifying needs and technological responses: to know the chemistry and biology processes of composting	I know about: • Conversion process whereby biological material becomes heat through chemical, thermal, and biochemical methods.
Bio conversion process	Identifying needs and technological responses: to assess needs and to identify, evaluate, control the heating process of biological material, control the combustion process, know and be able to analyse the chemical, thermal, and biochemical methods.	I know about: Conversion process whereby biological material becomes heat through combustion or biofuel through chemical, thermal, and biochemical methods.
Composting of organic waste and management	Identifying needs and technological responses: to assess needs and to identify, evaluate, control the process of biological material, control the combustion process, know and be able to analyse the chemical, thermal, and biochemical methods.	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • Determine and select the quantity of raw material components used • Control and evaluate the process results and plant performance • Help to eliminate faults

		Carry out care and maintenance work
Resolve equipment malfunctions	Identify, report and repair equipment damage and malfunctions; communicate with field representatives and manufacturers to obtain repair and replacement components.	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • Help to eliminate faults • Carry out care and maintenance work
Recycling	Identifying needs and technological responses: To know the circular economy, the compost processing and the use of fermentation	I know: • Forms, products, use and sustainability of the circular economy • Use of the fermentation residues (liquid and solid) as fertilizer)
Management	Identifying needs and mechanism of the overall managing the biogas production process.	 Independently, according to my own needs, I can: Implementation of the specifications for documentation Document the process in detail Information of customers and market partners about the environmentally sound operation of plants for energy production from biomass

III.b Food for packaging

The module Food and Packaging focus on the processing of packaging materials and other products, made from bio-materials, such as Rice, Corn, Starch, Cereals, Tomato plants, etc.

In this overview, competences are described for the production of the biomass and for the processing of it.

For production, competences are given for the cultures of rice and tomatoes.

For the processing, the needed technical competences and skills are closely related with the profession of chemical processing plant controllers, who control the chemical production processes and the quality of the products. They operate machines and systems, being responsible to monitor and maintain the equipment and the instruments in control.

See also transversal competences such as Health and Safety, GMP and HACCP.

Topics	Competences	Skills
Tomatoes production		
Working in a greenhouse	Identifying the instructions of climate control (light, heat, humidity)	I know •how to control the light (intensity and duration)
Working in a greenhouse	Identifying of preparing the soil and nutrition/water system and planting	I can • work with rock wool and connect it to the recirculation water system
Working in a greenhouse	Identifying of the management biological pest control	I can • use biological products, such as humble bees for pollination
Cultivation of tomatoes	Identifying the monitor the growing process and the quality control of it	I can • treat the plants according the instruction
Harvesting tomatoes	Identifying the management of harvesting of tomatoes and post harvesting activities	I can • harvest the tomatoes on the right time and prepare them for selling
Harvesting tomatoes	Identifying the plan and implement harvesting of the tomato plant	I know • when I can harvest the plants and how to prepare them for processing
Rice production		
Biomass production and management	Identifying of plan, organize and perform farming operations to grow	 I know: monitoring market activity and conditions, determining types and quantities of crops to be grown, and planning and coordinating production accordingly preparing soil by hand or machine, and spreading fertilizers and manure selecting and sowing seeds, and planting seedlings maintaining crops by cultivating soil
Harvesting rice	Identifying of management of harvest methods; the estimation of by-products biomass potential	I know: • harvest various types of field crop such as wheat and other cereals, rice • harvesting crops and destroying diseased or superfluous crops

Energy uses	Identifying by-products for non-energy and energy uses	I know:
Biomass evaluation	Identifying of biomass as a by-product of food production process that can be re-used	I know: • The content, the availability, purity and quality of biomass • The aiming at construction material and material for plastic of bio-fibers
Packaging process		
Biobased material	Identifying physical and mechanic features / characteristic of Biobased material	I know about: • The variety of bioplants, their physical and mechanic characteristic • Biology and growing the bioplants • Biology and fermentation of bioplants
Production of bio- packaging material	Identifying technological and chemistries responses: to know the process of fermentation, the processing methods / types	 I know about: The process of fermentation of bioplants Conversion process whereby bioplants becomes heat through chemical, thermal, and biochemical methods the variety of processing methods The design of bio-packaging according the specifications of the product and offer solutions to solve packaging problems. About different processes PLA, CPLA, TPS
Production of bio- packaging material	Identifying the technical features, benefits and limits of biopackaging	 I know about: the process of producing bio-package and I know the features of bioplants for the production process I can: analyse bio-packaging requirement considering engineering, economic, ergonomic, and other perspectives.
Production of bio- packaging material	Identifying new packaging concepts	I know about: • Innovative packaging concepts a) sugar (cane) for Tetra pack, b) milk for eatable foil, c) Algae, d) PLA (compostable bottles)

Control of process	Identifying the Standard Operating Procedures (= SOP).	I know about: • The instructions of the SOP • Carry out complex routine operations I can: • Write a standard operating procedures • apply quality standards • control the production process
Control of process	Identifying the monitor manufacturing quality standards	I know about: • The ranking of factors and the product quality • how its customers define quality • the parameters of the production process I can: • sacrifice some aspect of quality for the sake of the process or underlying economics • solve problems • measure the quality of the products • optimise the production process parameters
Quality control	Identifying the testing procedures	 I know: when I have to take samples, analyse the samples and make conclusions how to take samples how to analyse the samples and make conclusions
Quality control	Identifying the test procedures and the ICT systems	I know: • the ICT systems I can: • test the raw material for the process • manage and monitor facts and figures of the process and products
Logistics	Identifying the manufacturing deadlines pressure	I can: • Cope with a tight schedule on the manufacturing processes level • take the necessary actions when deadlines approach or when some processes fail

Ecological benefits	Identifying benefits of bio-packaging	I know about:
		• The circular economy of the process,
		• The sustainable process and the ,
		• The reduction of CO2 and NO2
		The re-usability of the products

III.c Algae

Aquaculture workers breed and raise fish and cultivate mussels, oysters and other forms of aquatic life, for sale or delivery on a regular basis to wholesale buyers, marketing organizations or at markets.

topics	Competences	Skills	ranking		
			Very important	important	Less important
Breeding, reproduction, structure and cultivating	To know about structure, breeding rearing, and production	I know about: The variety of algae, their mechanism and periods of reproduction Biology and growing The complete process of algae breeding (precultivation – screening- industrial algaecultivation in open basins			
Production and environmental data	Ensure that operations comply with standards for sustainable aquaculture	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • Use the methods, characteristics and equipment to cultivate microalgae • Control and evaluate the production process • Use the environmental data • ensure maintenance of optimum conditions for aquatic life • Carry out care and maintenance work			

		• the transformation of solar energy and CO ₂ into biomass, energy and O ₂		
Harvest of algae	Ensure that careful, superficial and automated algae harvest	I know: The technical systems from of tubes and reproduction basins Storage and processing of biomass for energy use		
Circular economy	I know the complete process of algae production	I know: The circular economy from algae production and processing to the use of climate-relevant CO2 and energy forms		
identify diseases or parasites	Monitor the health, based on feeding and general behaviour. Interpret environmental parameters and analyse mortalities.	Independently, according to my own needs, and solving well-defined and non-routine problems, I can: • Identify diseases • Interpret parameters • Control and evaluate the process		
Monitoring and documentation	Compose work-related reports that support effective relationship management and a high standard of documentation	 Independently, according to my own needs I can: Write and present the results and conclusions in a clear way Write a documentation, based on formats Make a monitoring based a of a defined procedure 		
Maintaining equipment	Measure and control water quality	I can: • Control Measure water quality: temperature, oxygen, pH, N ₂ , NO ₂ , NH ₄ , CO ₂ , turbidity. • Monitor microbiological water quality. • Cleaning and preparing the equipment		

IV How to set up a bio-based company?

In this section, you find competences and skills, which are important for starting a bio-based company. You will see that these competences and skills are not pure technical, but more connected to entrepreneurial competences, as described in section II.

topics	Competences	Skills
Circular economy	To Identify European and regional strategies,	I know about: • The European strategy and the goal of the circular economy • The definition and principles of circular / bio-based economy • Sustainable growth and revitalising rural area I can: • Explain the specific orientation of Bio-Based Economy, it's goal / vision in Europe and in my region
Circular economy	To know about the bio-based value chains	On my own and together with my peers, I know: • The process for identifying needs • About alternatives of BBE-systems (example: aquaculture, algae) • The agro-food chains to achieve a win-win-situation • About the sustainability and profitability of BBE-systems I can: • Analyse and define requirements of BBE-activities in my company • Create bio-based concepts aimed at healthy and sustainable food products • Design sustainable BBE-systems
Business plan	To Identify, monitor and develop a BBE-strategy	On my own and together with my peers I know about: • The evaluation and analysis for development of bio-based value chain and market • The principles and types of BBE-business • The methods to create a BBE-strategy for a company
Business plan	To analyse BBE-resources, markets, financial and technical aspects	On my own and together with my peers I can:

		 Identify the basic function of BBE for my own company Tell about the value and benefit of developing a BBE-company Explain the benefit of social, ecologic and economic value
Business plan	To Identify legal and financial aspects for setting up a BBE-company	On my own and together with my peers I know about: • Measures to support the setting up procedure • Legislations rules On my own and together with my peers I can: • Create a financial business plan • Be active to communicate with financial partners • Explain my financial business plan in my network
Business plan	To monitor market activities	On my own and together with my peers I can: • Check market activities • Plan the production to meet contract requirements and market demand
Marketing plan	To identify measures and marketing tools to create a marketing plan	On my own and together with my peers I know about: • Measures, like planning, communication, negotiation, relationship, to create a marketing plan, • Marketing tools
Marketing plan	To establish a partnership	On my own and together with my peers I can: • Create a network • Take part in group dynamics aimed to create a BBE-system in the region • Explain and illustrate the value of my idea
Human Resource plan	To identify measures and methods to develop a human resource plan / management	On my own and together with my peers I know about: • Identity of my company business • The development of an educational plan • Measures and methods to develop my teams On my own and together with my peers I can: • Develop an educational strategy for development of my teams

		Motivate my teams Communicate the human resource activities
Control	To identify control mechanism	On my own and together with my peers I know about:
		Measures and methods of controlling
		Controlling and evaluation the process