European Software
Skills Alliance.

ESSA Learning programmes

ANNEX V
DevOps expert EQF 7

30 November 2023

Status: Final version

Co-funded by the
Erasmus+ Programme
of the European Union

ESSA Learning programme – DevOps expert EQF 7, 2024.

Deliverable 10 – ESSA Learning Programmes & Materials – ANNEX V

This document is a draft version and is subject to change after review coordinated by the European Education and Culture Executive Agency (EACEA).

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About ESSA

The European Software Skills Alliance (ESSA) is a four-year transnational project funded under the EU's Erasmus+ programme. It ensures the skills needs of the rapidly evolving Software sector can be met — today and tomorrow.

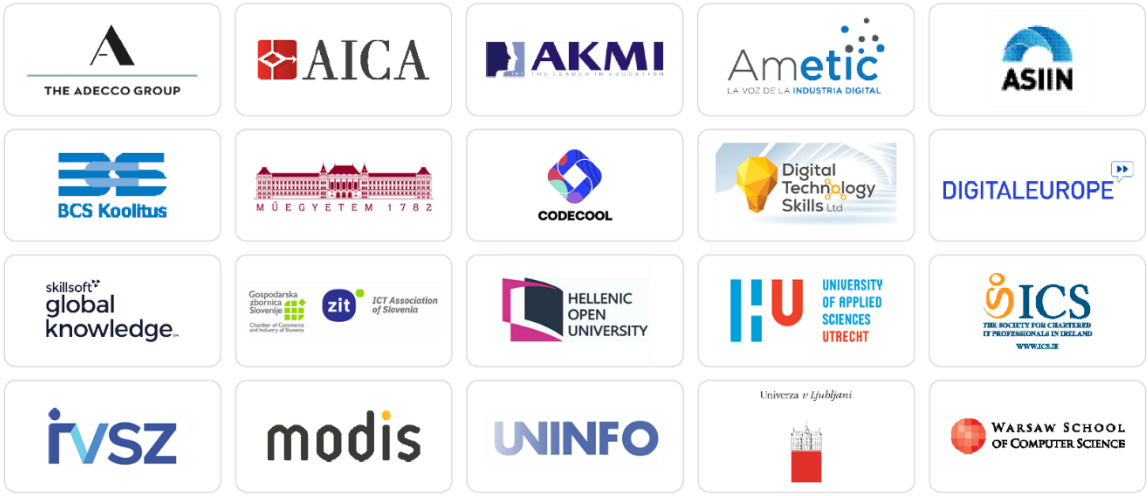
ESSA provides current and future software professionals, learning providers and organisations with software needs with the educational and training instruments they need to meet the demand for software skills in Europe.

ESSA will develop a European Software Skills Strategy and learning programmes for Europe. It will address skill mismatches and shortages by analysing the sector in depth and delivering future-proof curricula and mobility solutions; tailored to the European software sector's reality and needs.

Project partners

The ESSA consortium is led by DIGITALEUROPE. It is composed of academic and non-academic partners from the education, training, and software sectors.

View all project partners: ESSA Partners | ESSA Associated Partners



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List of abbreviations and acronyms

Abbreviation	Term
e-CF, EN 16234-1	European e-Competence Framework, European Norm 16234 - Part 1: Framework
ECTS	European Credit Transfer and Accumulation System
EQF	European Qualifications Framework
ESSA	European Software Skills Alliance
LO	Learning Outcome
PLO	Programme Learning Outcome

1 DevOps expert EQF 7 – ESSA Learning Programme

1.1 University students and professionals

Executive summary

This Learning Programme is being designed by Hellenic Open University (EL). The DevOps expert curriculum proposed is an EQF level 7 programme targeted primarily at higher education institutions, that use the distance learning methodology. This curriculum is designed to equip university students and professionals on upskilling or reskilling pathways with in-depth DevOps knowledge. The curriculum comprises ten (10) distinct Learning Units spanning a range of topics from foundational concepts to advanced DevOps practices, aiming to facilitate an intensive, comprehensive learning experience. The Learning Program provides flexible learning pathways to cater to diverse learner needs. It can be delivered through multiple channels including in-person classroom sessions, virtual classrooms, blended learning formats, and e-learning platforms, while also integrating work placement opportunities to translate theory into practice. The curriculum's design accommodates localization characteristics to ensure adaptation to national contexts. It takes into consideration the current technology maturity levels, future direction in software engineering, including the prevalent DevOps tools and methodologies, and the legal context, such as data protection and privacy regulations. This program aligns with international best practices while factoring in local peculiarities, providing students with a well-rounded and highly applicable DevOps education.

Targeted Institutions: Higher Education

The recommended Learning programme is articulated in ten (10) Learning Units, for a total of 15 ECTS.

The recommended delivery method is e-Learning.

1.1.1 PLO 1. Component integration [e-4]

1. PLO Component Integration [e-4]	
The learner has demonstrated capability *→ to provide expert guidance or advice on integration of an advanced/ innovative solution, software application or component*	
Unit learning outcomes	Creates and guides a process for integration of an advanced/ innovative solution, software application or component (e.g., proposes standards of practice; for a solution related to e.g., machine learning, cloud, big data, blockchain, IoT)
	Writes a report/ advisory report/ paper/ research article on integration of a solution or software application in an innovative/ advanced/ complex situation (e.g., an analysis of software integration challenges related to a particular technology or method, a process/HR/internal standards design for an integration cycle, a resource assignment plan)

1.1.1.1 Duration of Study

Recommended duration: starting from 3 ECTS

Often integrated with studies of PLOs: -

1.1.1.2 Recommendations for Micro-credentials

- This PLO should be an integral part of the advanced studies for students with prior knowledge of software development.
- Recommended as an independent micro-credential for upskilling DevOps engineers.

1.1.1.3 Recommendations on Didactical Approach, Delivery Methods and Training Environment

Recommended didactical approach:

- e-learning ☒
- Work placement ☒

Additional comments

n/a

Recommended delivery methods:

- Lecture ☒ up to 50%
- Case study. Individual/team project ☒ 50+%

Additional comments

Lectures, e-learning are recommended for learning the basic principles, terminology, and models of component integration. These should be reinforced through practical tasks, case studies, individual/team-projects.

1.1.1.4 WBL and Follow-up Reinforcement

After learning the basic principles, terminology, and models of component integration, the study should focus on analysing and simulating real work-life-like tasks as, for example:

- Component Documentation: Students will write clear, concise documentation for a software component's integration points. This exercise simulates the necessity of proper documentation in managing dependencies and expectations between different components and teams.
- Troubleshooting Integration Issues: This task involves simulating a component integration issue in a larger system and encouraging students to diagnose and solve the problem.

1.1.1.5 Important (new) approaches and technologies to consider

- Containerization Technologies (Docker/Kubernetes): These allow the encapsulation of software components along with their dependencies, ensuring consistency across different computing environments. Kubernetes extends this by providing orchestration capabilities for managing containers at scale.
- Service Mesh (Istio/Linkerd): These are used to manage inter-service communication in a microservices architecture, providing capabilities such as load balancing, service discovery, and traffic control.

1.1.1.6 Assessment

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
Creates and guides a process for integration of an advanced/ innovative solution, software application or component (e.g., proposes standards of practice; for a solution related to e.g., machine learning, cloud, big data, blockchain, IoT)	Practical assignment	Assessment (of skills)
Writes a report/ advisory report/ paper/ research article on integration of a solution or software application in an innovative/ advanced/ complex situation	Report	Assessment (of report)

1.1.2 Learning Resources – PLO 1. Component integration [e-4]

LEARNING UNIT	EQF	Duration	Didactical Approach	ASSESSMENT	Title of the Learning material	Delivery method of the learning material	Quick link to learning materials
Introduction to Component Integration	7	1 ECTS	eLearning	Practical assignment	Introduction to Component Integration.docx	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-4-7-Component-Integration.pptx https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-4-7_Agile-management-for-DEVOPS.docx https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-7-Integrating-Components-for-Machine-Learning-Project.pptx
Continuous Integration Practices	7	1 ECTS	eLearning	Report	Continuous Integration Practices.docx	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-4-7-Component-Integration.pptx https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-

							Programmes-and-Materials-EQF-4-7_Agile-management-for-DEVOPS.docx https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-7-Integrating-Components-for-Machine-Learning-Project.pptx
Integrating Components for Machine Learning Project	7	1 ECTS	eLearning	Practical assignment	Integrating Components for Machine Learning Project.docx	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-4-7-Component-Integration.pptx https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-4-7_Agile-management-for-DEVOPS.docx https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-7-Integrating-Components-for-Machine-Learning-Project.pptx

1.1.3 PLO 2. Testing [e-4]

2. PLO Testing [e-4]	
The learner has demonstrated capability *→ to provide expert guidance or advice on testing of an advanced/ innovative solution, software application or component*	
Unit learning outcomes	Creates and guides a process for testing an advanced/ innovative solution, software application or component (e.g., proposes standards of practice; for a solution related to e.g., machine learning, cloud, big data, blockchain, IoT)
	Writes a report/ advisory report/ paper/ research article on a topic related to testing of an innovative/ advanced/ complex solution, software application or component or on issues regarding testing in specific situations (e.g., agile testing, a process design for an entire testing activity, specification of internal standards of practice for testing, test management plan for CI testing)

1.1.3.1 Duration of Study

Recommended duration: starting from 3 ECTS

Often integrated with studies of PLOs: -

1.1.3.2 Recommendations for Micro-credentials

- This PLO should be an integral part of the advanced studies for students with significant prior knowledge of DevOps practices.
- Recommended as an independent micro-credential for upskilling senior DeVOps experts.

1.1.3.3 Recommendations on Didactical Approach, Delivery Methods and Training Environment

Recommended didactical approach:

- e-learning ☒
- Work placement ☒

Additional comments

n/a

Recommended delivery methods:

- Lecture ☒ up to 50%
- Case study. Individual/team project ☒ 50+%

Additional comments

Lectures, e-learning are recommended for learning the basic principles, terminology, and models of DevOps testing practices. These should be reinforced through practical tasks, case studies, individual/team-projects.

1.1.3.4 WBL and Follow-up Reinforcement

After learning the basic principles, terminology, and models of DevOps testing, the study should focus on analysing and simulating real work-life-like tasks as, for example:

- Automating Infrastructure Setup with Infrastructure as Code (IaC): Using tools like Terraform, Ansible, or AWS CloudFormation, students can learn to set up and automate an entire infrastructure for a web application. This might include setting up the database, web server, application server, and load balancers.
- Implementing CI/CD Pipelines: Students can create CI/CD pipelines using tools like Jenkins, GitLab CI/CD, or GitHub Actions. This should include build automation, testing, deploying to a staging environment, manual approval processes, and deploying to production.

1.1.3.5 Important (new) approaches and technologies to consider

- Progressive Delivery: It is an approach that focuses on advancing new features and services into production in a controlled and gradual way. Techniques under this include Canary releasing, Blue-Green deployments, etc.
- Observability: More than just monitoring, observability includes the gathering, visualizing, and analyzing of metrics, logs, and traces from a system. Tools like Prometheus, Grafana, ELK Stack, Jaeger, etc., play a significant role in this domain.

1.1.3.6 Assessment

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
Creates and guides a process for testing an advanced/ innovative solution, software application or component (e.g., proposes standards of practice; for a solution related to e.g., machine learning, cloud, big data, blockchain, IoT)	Practical assignment	Assessment (of skills)
Writes a report/ advisory report/ paper/ research article on a topic related to testing of an innovative/ advanced/ complex solution, software application or component or on issues regarding testing in specific situations	Report	Assessment (of report)

1.1.4 Learning Resources - PLO 2. Testing [e-4]

LEARNING UNIT	EQF	Duration	Didactical Approach	ASSESSMENT	Title of the Learning material	Delivery method of the learning material	Quick link to learning materials
Automation test strategies	7	2 ECTS	eLearning	Practical assignment	*Automation test strategies*	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/ESSA_Learning-Programmes-and-Materials-EQF-7__Automation-Test-Strategies.docx
Configuration Management	7	1 ECTS	eLearning	Report	*Configuration Management*	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-TESTING-CONFIGURATION-MANAGEMENT-LU.docx

1.1.5 PLO 3. ICT Systems Engineering [e-4]

3. PLO ICT systems engineering [e-4]	
The learner has demonstrated capability *→ to propose and design a cohesive and efficient system infrastructure*	
Unit learning outcomes	Writes a proposal for a cohesive and efficient system infrastructure (e.g., incorporating advanced/ innovative solutions, methods, tools and/or technologies, e.g., focusing on practices, procedures, system requirements, security, data protection, energy efficiency) (e.g., architecture and design of complex systems, application of agile software development lifecycle methodologies, managing infrastructure engineering implications in system design, managing continuous delivery in systems integration, application of test specifications methodologies in systems integration)
	Designs a full DevOps pipeline, by formulating a set of practices and tools that the development and operations teams may implement to build, test, and deploy software

1.1.5.1 Duration of Study

Recommended duration: starting from 2 ECTS

Often integrated with studies of PLOs: -

1.1.5.2 Recommendations for Micro-credentials

- This PLO should be an integral part of the advanced studies for students with prior knowledge of software development.
- Recommended as an independent micro-credential for upskilling junior DevOps developers.

1.1.5.3 Recommendations on Didactical Approach, Delivery Methods and Training Environment

Recommended didactical approach:

- e-learning ☒
- Work placement ☒

Additional comments
n/a

Recommended delivery methods:

- Lecture ☒ up to 50%
- Case study. Individual/team project ☒ 50+%

Additional comments
Lectures, e-learning are recommended for learning the basic principles, terminology, and models of ICT architectures. These should be reinforced through practical tasks, case studies, individual/team-projects.

1.1.5.4 WBL and Follow-up Reinforcement

After learning the basic principles, terminology, and models of ICT architecture, the study should focus on analysing and simulating real work-life-like tasks as, for example:

- Develop a CI/CD Pipeline Proposal: Students could design a complete CI/CD pipeline, including stages for building the application, running automated tests, deploying to a staging environment, manual approval, and deploying to a production environment. The pipeline should incorporate advanced practices like blue/green or canary deployments.
- Implement DevSecOps: Ask students to propose a strategy for integrating security into the DevOps lifecycle, considering aspects like static code analysis, dependency scanning, and secrets management.

1.1.5.5 Important (new) approaches and technologies to consider

- **Infrastructure as Code (IaC)**: While not entirely new, the emphasis and reliance on IaC have grown. Newer tools like Pulumi, which extends the concept of IaC to allow developers to use familiar general-purpose languages like Python or JavaScript, are gaining traction.

1.1.5.6 Assessment

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
Writes a proposal for a cohesive and efficient system infrastructure (e.g., incorporating advanced/ innovative solutions, methods, tools and/or technologies, e.g., focusing on practices, procedures, system requirements, security, data protection, energy efficiency) (e.g., architecture and design of complex systems, application of agile software development lifecycle methodologies, managing infrastructure engineering implications in system design, managing continuous delivery in systems integration, application of test specifications methodologies in systems integration)	Practical assignment	Assessment (of skills)
Designs a full DevOps pipeline, by formulating a set of practices and tools that the development and operations teams may implement to build, test, and deploy software	Practical assignment	Assessment (of skills)

1.1.6 Learning Resources – PLO 3. ICT Systems Engineering [e-4]

LEARNING UNIT	EQF	Duration	Didactical Approach	ASSESSMENT	Title of the Learning material	Delivery method of the learning material	Quick link to learning materials
DEVOPS system infrastructure	7	1 ECTS	eLearning	Practical assignment	DEVOPS system infrastructure.docx	Lecture/Practical Assignment	https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-SYSTEMS-ENGINEERING-DEVOPS-SYSTEM-INFASTRUCTURE-LU.docx https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-SYSTEMS-ENGINEERING-DESIGN-OF-DEPLOYMENT-PIPELINES-LU.docx
Design of deployment pipelines	7	1 ECTS	eLearning	Practical assignment	Design of deployment pipelines.docx	Lecture/Practical Assignment	https://learn.softwareskills.eu/wp-content/uploads/2023/11/DEVOPS-EXPERT-EQF7-SYSTEMS-ENGINEERING-DESIGN-OF-DEPLOYMENT-PIPELINES-LU.docx https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-SYSTEMS-ENGINEERING-DESIGN-OF-DEPLOYMENT-PIPELINES-LU.docx

1.1.7 PLO 4. Profession related competences [EQF7]

4. PLO Profession related competences [EQF7]	
The learner has demonstrated capability *→ to apply profession related skills*	
Unit learning outcomes	Advises on the application of a new technology. Given a certain situation or context, writes a report with recommendations or an advice on a solution that involves the application of a new technology. Reflects critically on a new technology.
	Analyses, improves, and provides expert advice and guidance on security standards, regulations, measures, methods, tools, and techniques, taking into account the broader business context and current IT developments
	Analyses, improves, and provides expert advice and guidance on sustainability standards, regulations, measures, and methods, taking into account the broader business context and current IT developments
	Is continuously aware of ethical considerations and issues and applies these in professional context and activities. Forms and communicates an opinion based on incomplete and or limited information, taking into account social, scientific and ethical responsibilities related to the application of own knowledge and opinions. Promotes ethical thinking

1.1.7.1 Duration of Study

Recommended duration: starting from 3 ECTS

Often integrated with studies of PLOs:-

1.1.7.2 Recommendations for Micro-credentials

- This PLO should be an integral part of the studies for students with no prior knowledge of software development.
- Recommended as an independent micro-credential for upskilling Solution Designers.

1.1.7.3 Recommendations on Didactical Approach, Delivery Methods and Training Environment

Recommended didactical approach:

- e-learning ☒
- Work placement ☒

Additional comments
n/a

Recommended delivery methods:

- Lecture ☐ up to 50%
- Case study. Individual/team project ☐ 50+%

Additional comments
Lectures, e-learning are recommended for learning the basic principles, terminology, and behaviour models of various DeVOps Competences. These should be reinforced through practical tasks and case studies.

1.1.7.4 WBL and Follow-up Reinforcement

After learning the basic principles, the study should focus on analysing and simulating real work-life-like tasks as, for example:

- Ethical Impact Assessment: Students can be given a scenario where they have to design a solution with potential ethical implications (e.g., a facial recognition system). They will need to identify the ethical considerations, discuss possible mitigation strategies, and justify their decisions in the context of existing ethical frameworks.
- Sustainable Solution Development: In this task, students could design a software solution with specific sustainability requirements, like minimizing power usage or ensuring the solution is designed in a way that it would remain relevant and usable for a long period of time (longevity). They could also be asked to assess and optimize the energy consumption of existing software systems.
- Accessibility and Inclusivity: In this task, students can be asked to design software that meets accessibility standards and is usable for people with various disabilities. They could be asked to simulate the experience of using their software as a person with a disability, and make necessary adjustments to improve accessibility.

1.1.7.5 Important (new) approaches and technologies to consider

- Green Software Engineering: This involves developing software in a way that minimizes its impact on the environment, for instance by optimizing its resource usage. This approach aligns with the growing emphasis on sustainability in all fields of technology.
- Ethics in AI: Given the increasing use of AI in decision-making processes, understanding how to develop and implement these systems ethically is crucial. This includes knowledge of bias, fairness, transparency, and accountability in AI systems.

1.1.7.6 Assessment

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
Advises on the application of a new technology. Given a certain situation or context, writes a report with recommendations or an advice on a solution that involves the application of a new technology. Reflects critically on a new technology.	Report	Assessment (of report)
Analyses, improves, and provides expert advice and guidance on security standards, regulations, measures, methods, tools, and techniques, taking into account the broader business context and current IT developments	Report	Assessment (of report)

1.1.8 Learning Resources - PLO 4. Profession related competences [EQF7]

LEARNING UNIT	EQF	Duration	Didactical Approach	ASSESSMENT	Title of the Learning material	Delivery method of the learning material	Quick link to learning materials
Security Considerations	7	1 ECTS	eLearning	Report	Security Considerations.docx	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-SYSTEMS-ENGINEERING-DESIGN-OF-DEPLOYMENT-PIPELINES-LU.docx https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-SYSTEMS-ENGINEERING-DESIGN-OF-DEPLOYMENT-PIPELINES-LU-1.docx
Cost Considerations	7	1 ECTS	eLearning	Report	Cost Considerations.docx	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/SOLUTION-DESIGNER-EQF7-CostConsiderations-LU.docx
Solution Architecture Document	7	1 ECTS	eLearning	Report	Solution Architecture Document.docx	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/SOLUTION-DESIGNER-EQF7-CostConsiderations-LU.docx

1.1.9 PLO 5. Soft competences [EQF7]

5. PLO Soft competences [EQF7]	
The learner has demonstrated capability *→ to apply soft skills*	
Unit learning outcomes	Related to the occupation, knowledge domain, and field of science, critically collects: in-depth and detailed professional and scientific information on a range of basic theories, principles and concepts, as well as information on some important current issues and topics. Analyses, evaluates, and combines critically this information, knowledge and insights and presents this in a scientific way. Critically applies/ translates/ interprets results of research (possibly executed by others) to the own context (the occupation and/or knowledge domain). Executes detailed scientific research
	Exercises (self-)management in situations that are complex, unpredictable and require new strategic approaches. Is able to cope with change (positive or negative), to adapt to a considerable level of variety in the workplace and to transform the work or study context. Handles pressure and setbacks and maintains composure. Shows initiative, creativity and originality and carries responsibility for the results of own activities, work and or study and for the work results of others. Works correctly and carefully, fully aware of the importance of trustworthiness and accountability.
	Realises learning and personal development, mostly autonomous and based on intrinsic motivation, looking for personal learning objectives. Selects and uses training/instructional methods and procedures appropriate for the situation when learning or teaching new things.

1.1.9.1 Duration of Study

Recommended duration: starting from 2 ECTS

Often integrated with studies of PLOs:

1.1.9.2 Recommendations for Micro-credentials

- This PLO should be an integral part of the initial studies for students with some knowledge of software development.
- Recommended as an independent micro-credential for upskilling DevOps Experts.

1.1.9.3 Recommendations on Didactical Approach, Delivery Methods and Training Environment

Recommended didactical approach:

- e-learning ☒
- Work placement ☒

Additional comments

n/a

Recommended delivery methods:

• Lecture	☒ up to 50%
• Case study. Individual/team project	☒ 50+%

Additional comments

n/a

1.1.9.4 WBL and Follow-up Reinforcement

After learning the basic principles, terminology, and model soft competences, the study should focus on analysing and simulating real work-life-like tasks as, for example:

- Project Management Simulation: Assign students a project where they need to develop a hypothetical software solution. This could be anything from a mobile app to a data analysis system. Make the project parameters vague and open-ended, and introduce unexpected changes or challenges partway through. This will require them to strategize, adapt, and manage their resources effectively. To enhance the complexity, include multiple stakeholders with varying interests and requirements.
- Peer-Led Learning Sessions: Encourage students to select a topic related to the course content that they're particularly interested in, and then task them with leading a class session or workshop on that topic. This will help foster autonomous learning and teaching skills, and help them develop the ability to choose appropriate instructional methods for different situations.
- Failure Analysis: Have students examine real-life cases of software solution failures. They could analyse why the solution failed, how the situation was managed, and how it could have been handled better. This will help them learn how to handle setbacks, manage pressure, and strategize in complex, unpredictable situations.
- Independent Research Project: Assign an open-ended research project that requires students to investigate and present on a current trend or issue in the software solutions field. The project can be chosen based on the students' own interests, encouraging intrinsic motivation and personal learning objectives.

1.1.9.5 Important (new) approaches and technologies to consider

- Collaborative Tools: Technologies like Microsoft Teams, Slack, and GitHub facilitate collaboration and can help students learn to work as part of a team, manage their time and tasks, and navigate a remote work environment.
- Online Learning Platforms: Sites like Coursera, edX, and LinkedIn Learning allow students to pursue additional learning autonomously. This can be particularly useful for helping them find and explore personal learning objectives.
- Digital Portfolios: Tools like GitHub, Behance, and Dribbble allow students to showcase their work and track their learning progress. These portfolios can also help them reflect on their growth, set goals, and take responsibility for their learning outcomes.

1.1.9.6 Assessment

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
Related to the occupation, knowledge domain, and field of science, critically collects: in-depth and detailed professional and scientific information on a range of basic theories, principles and concepts, as well as information on some important current issues and topics. Analyses, evaluates, and combines critically this information, knowledge and insights and presents this in a scientific way. Critically applies/ translates/ interprets results of research (possibly executed by others) to the own context (the occupation and/or knowledge domain). Executes detailed scientific research	360° assessment	360° assessment
Exercises (self-)management in situations that are complex, unpredictable and require new strategic approaches. Is able to cope with change (positive or negative), to adapt to a considerable level of variety in the workplace and to transform the work or study context. Handles pressure and setbacks and maintains composure.	Practical assignment	Assessment (of skills)
Shows initiative, creativity and originality and carries responsibility for the results of own activities, work and or study and for the work results of others.	Practical assignment	Assessment (of skills)

1.1.10 Learning Resources - PLO 5. Soft competences [EQF7]

LEARNING UNIT	EQF	Duration	Didactical Approach	ASSESSMENT	Title of the Learning material	Delivery method of the learning material	Quick link to learning materials
Learning Soft Skills to Become a Better Solution Architect	7	2 ECTS	eLearning	Practical assignment	Learning Soft Skills to Become a Better Solution Architect.docx	Lecture/Project	https://learn.softwareskills.eu/wp-content/uploads/2024/01/SOLUTION-DESIGNER-EQF7-SOFT-COMPETENCES-LEARNING-SOFT-SKILLS-LU-1.docx

1.1.11 PLO 6. Functioning in organisation [EQF7]

6. PLO Functioning in organisations [EQF7]	
The learner has demonstrated capability *→ to function in an organisational context*	
Unit learning outcomes	Explains organisation theory and behaviour
	Describes the relationship between business and IT
	Works in an organisational context under broad direction, performing coordinating activities, with at least 3 years of working experience at an intermediate or senior level, as e.g., a specialist, team leader, manager, or a comparable role
	Leads a project
	Writes a report on functioning in organisation

1.1.11.1 Duration of Study

Recommended duration: starting from 2 ECTS

Often integrated with studies of PLOs: -

1.1.11.2 Recommendations for Micro-credentials

- Recommended as an independent micro-credential for upskilling DevOps Experts.

1.1.11.3 Recommendations on Didactical Approach, Delivery Methods and Training Environment

Recommended didactical approach:

- e-learning ☒
- Work placement ☒

Additional comments

Recommended delivery methods:

- Lecture ☒ up to 50%
- Case study. Individual/team project ☒ 50+%

Additional comments

n/a

1.1.11.4 WBL and Follow-up Reinforcement

After learning the basic principles, terminology, and models of how a DevOps expert should function within an organisation, the study should focus on analysing and simulating real work-life-like tasks as, for example:

- Case Study Analysis: Students can study real-life examples of successful and unsuccessful software projects within organizations. They can analyze what went well, what went wrong, and how organizational theory and behavior influenced the outcomes.
- Cross-functional Teamwork: Assign students to teams that mimic the structure of a real software development team, with roles such as project manager, developer, UX/UI designer, and quality assurance. This task will help them understand the dynamics of working in a cross-functional team and the challenges and benefits that come with it.
- Stakeholder Communication Simulation: In this task, students can simulate meetings with various stakeholders, such as clients, senior management, or other teams within the organization. This will give them practice communicating effectively in a professional setting and managing expectations.

1.1.11.5 Important (new) approaches and technologies to consider

- Digital Collaboration Tools: Platforms like Slack, Microsoft Teams, or Asana can simulate real-world project management and team collaboration. They can help students learn how to coordinate with remote or distributed teams, which is increasingly common in the software industry.
- Business Process Automation Tools: Software like Zapier or Integromat can be introduced to show students how repetitive tasks can be automated in an organization, thus improving efficiency and allowing more focus on strategic tasks.
- Data Analytics Tools: Understanding data analytics tools like Google Analytics, Tableau, or PowerBI can be essential for making data-driven decisions. These tools can support case study analysis and help students grasp the impact of metrics and KPIs on organizational behavior and strategies.

1.1.11.6 Assessment

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
Explains organisation theory and behaviour	Practical assignment	Assessment (of skills)
Describes the relationship between business and IT	Self-reflection report	Assessment (of report)

1.1.12 Learning Resources - 6. PLO Functioning in organisation [EQF7]

LEARNING UNIT	EQF	Duration	Didactical Approach	ASSESSMENT	Title of the Learning material	Delivery method of the learning material	Quick link to learning materials
Organisational Culture for Continuous delivery	7	1 ECTS	eLearning	Practical assignment	Organisational Culture for Continuous delivery	Organisational Culture for Continuous delivery.docx	https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-FUNCTIONING-ORGANISATIONS-ORGANISATIONAL-CULTURE-LU.docx.docx
Collaborative Management for DEVOps	7	1 ECTS	eLearning	Self-reflection report	Collaborative Management for DEVOps	Collaborative Management for DEVOps.docx	https://learn.softwareskills.eu/wp-content/uploads/2024/01/DEVOPS-EXPERT-EQF7-FUNCTIONING-ORGANISATIONS-COLLABORATIVE-MANAGEMENT-LU.docx

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Co-funded by the
Erasmus+ Programme
of the European Union