European Software Skills Alliance.

EDUCATIONAL PROFILE

ESSA Developer

EQF 7

This educational profile belongs to the field of Software Engineering and is covered by relevant references in EN 16234-1:2019 (e-CF) and ISO/IEC/IEEE 90003:2018.

Software developers build and create computer programs, including mobile applications, desktop applications, hybrid applications, or even sometimes operating systems. They may also be involved in **other aspects of software development**, including identifying user needs, software design, testing new software, software implementation, and making changes to the system. **Software developers play a critical role in many different professional fields** such as computer systems, manufacturing, finance, and software publishing.

Software developers at Master level develop, test, implement, and maintain advanced/ innovative software solutions in accordance with customer needs. They may be also involved in the design of these applications. Developers at Master level have a deeper knowledge of one or more technologies, e.g., mobile computing, cloud technologies, Internet of Things, artificial intelligence, and blockchain. They also oversee development and integration processes and projects and may initiate, plan, and coordinate these processes and projects.

Learn more:

The Erasmus+ project ESSA (European Software Skills Alliance) aims to skill, upskill, and reskill individuals into high-demand software roles across the EU.

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About this profile

This profile is for educating people with prior obtained ICT knowledge and skills at EQF 6 level to build and implement advanced software components and applications for moderately advanced problems/projects/tasks in a variety of application areas, based on specifications and designs by using programming languages, tools, and platforms.

The profile has an EQF 7 level. Specific ICT knowledge and skills related to the role of software developer obtained at EQF 6 level are required.

This level requires:

- **Autonomy:** Coordinates and directs. Addresses issues with many interacting factors.
- **Context:** Unstructured multidisciplinary and/or specialist context.
- **Content**: New concepts for deepening and innovation that are transferable to other situations.

Competences

e-CF competences (incl. e-CF level)	General competences (incl. EQF level)
A.6. Application Design [e-4]	P. Profession-related competences (EQF7)
B.1. Application Development [e-4]	I.S. Interpersonal soft competences (EQF7)
B.2. Component Integration [e-4]	P.S. Personal soft competences (EQF7)
B.3. Testing [e-4]	F.O. Functioning in organisations (EQF7)

Deliverables

Learners should master the following deliverables:

- Requirements and functional specifications
- Design for an advanced/ innovative solution, software application or component
- Complex code and related documentation
- Advanced/ innovative working software component/ application
- Process for integration of an advanced/ innovative solution, software application or component
- (Advisory report)/ paper/ research article on integration of a solution or software application in an innovative/ advanced/ complex situation
- Process for testing an advanced/ innovative solution, software application or component
- (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 with recommendations or advise on a solution that involves the application of a new technology
- Critical reflection on a new technology
- Project plan for the design and development of an advanced/ innovative solution, application or software component
- Self-reflection report
- Report on functioning in organisation

Professional perspectives

Upon completing this programme, the learner is eligible to apply for **junior developer positions** such as Web Developer - Computer Programmer - Database Administrator - Software Developer - Software Engineer - Java Developer - Full-stack Developer - Font-end Developer - Back-end Developer

Educational perspectives

After completing this programme, the learner may continue in a **related Master programme, in a Ph.D. programme, or an (in-service) postgraduate study programme.**

The learner also has a proper base for specialised training and certification such as Specific programming languages (e.g., Java, Python, C++) - Cybersecurity - Data analytics - Software architecture - Blockchain - Machine Learning/AI - DevOps - IoT/Automation/Robotics

Programme Learning Outcomes (PLO)

1. PLO Application Design [e-4]	
The learner has demonstrated capability *→ to specify a design for an advanced/ innovative solution, software application or component*	
Unit learning outcomes	Assesses needs of customers, users, and stakeholders and formulates **requirements and functional specifications,** taking into account overall business needs (e.g., by performing a requirements analysis)
	Specifies **a design for an advanced/ innovative solution, software application or component,** taking into account specific constraints/ requirements (e.g., related to machine learning, cloud, big data, blockchain, IoT; constraints such as e.g., impact on the organisation/ business/ society; the development environment, programming language, technology, requirements related to performance, security, accessibility, usability, privacy, ethics, safety, IS policy, cost, quality)

2. PLO Application Development [e-4]	
The learner has demonstrated capability *→ to creatively develop and validate an advanced/ innovative solution, software application or component*	
Unit learning outcomes	Writes **complex code and related documentation** to it, taking into account relevant principles and constraints
	Creates **an advanced/ innovative working software component or application,** that satisfies its requirements, applying complex techniques and tools (e.g., embedded software, cloud-based applications; related to e.g., machine learning, cloud, big data, blockchain, IoT)

3. 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)

4. PLO Testing [e-4]	
The learner has demonstrated capability *→ to provide expert guidance or advice on testing 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)

5. 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

6. 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.

7. 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**

Assessments

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
1.1	Practical assignment	Assessment (of skills)
1.2	Practical assignment	Assessment (of skills)
2.1	Practical assignment	Assessment (of skills)
2.2	Practical assignment	Assessment (of skills)
3.1	Practical assignment	Assessment (of skills)
3.2	Report	Assessment (of report)
4.1	Practical assignment	Assessment (of skills)
4.2	Report	Assessment (of report)
5.1	Report	Assessment (of report)
5.2	Report	Assessment (of report)
6.1	360° assessment	360° assessment
6.2	Practical assignment	Assessment (of skills)
6.3	Practical assignment	Assessment (of skills)
6.4	360° assessment	360° assessment
7.1	Practical assignment	Assessment (of skills)
7.2	Self-reflection report	Assessment (of report)
8.1	Exam	Certification
8.2	Exam	Certification
8.3	360° assessment	360° assessment
8.4	Report	Assessment (of report)