

European Software Skills Alliance.

EDUCATIONAL PROFILE ESSA Developer EQF 6

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 Bachelor level develop, test, implement, and maintain basic software solutions in accordance with customer needs. They may be also involved in the design of these applications. They account for development activities of others.

Learn more:

About this profile.....	2
Competences.....	2
Deliverables	2
Professional perspectives.....	3
Educational perspectives	3
Programme Learning Outcomes (PLO)	4
Assessments.....	7

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



About this profile



This profile is for educating people, with or without previous ICT knowledge, to build and implement software components and applications based on specifications and designs using programming languages, tools, and platforms.

The profile has an EQF 6 level. No prior knowledge of the topic is required.

This level requires:

- **Autonomy:** Works independently under broad direction to solve problems. Has a positive effect on team performance.
- **Context:** Structured – unpredictable context, vague problems, open approach and solution space.
- **Content:** Combination of multiple concepts for advancement and innovation in the local situation.

Competences

e-CF competences (incl. e-CF level)	General competences (incl. EQF level)
A.6. Application Design [e-3]	P. Profession-related competences (EQF6)
B.1. Application Development [e-3]	I.S. Interpersonal soft competences (EQF6)
B.2. Component Integration [e-2]	P.S. Personal soft competences (EQF6)
B.3. Testing [e-2]	F.O. Functioning in organisations (EQF6)
B.5. Documentation Production [e-3]	
C.4. Problem Management [e-3]	

Deliverables

Learners should master the following deliverables:

- Requirements and functional specifications
- Functional and data modelling diagrams
- Database design
- Simple system architecture and interfaces
- Design for an application or software (component)
- Overall plan for the design
- A structured dataset
- Code and related documentation
- Working software component/ application
- Modified existing software component/ application
- Installation report
- (Automated) test
- Test result documentation/ test report
- (Parts of) relevant technical documents
- Solved incident
- Impact assessment of failure
- Report on the application of a method, technique or tool related to a new technology
- Overall project plan for the design/development of an application or software component
- Self-reflection report
- Report on functioning in an 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 - Front-end Developer - Back-end Developer

Educational perspectives

After completing this programme, the learner may continue in a **Master's Developer programme** with a focus on more complex and specific application technologies and architectures.

The learner also has a proper base for more advanced 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 - Testing

Programme Learning Outcomes (PLO)

1. PLO Application Design [e-3]

The learner has demonstrated capability

→ to specify a design for a software application or component that meets requirements

→ to organise the planning of the design of an application or software component

Unit learning outcomes	Explains and distinguishes principles and terminology of software design (e.g., phases in the design process, techniques, deliverables)
	Describes principles of usability, UI/UX design, accessibility, privacy, security
	Identifies needs of customers, users, stakeholders and formulates requirements and functional specifications
	Creates functional and data modelling diagrams , using common languages and techniques (e.g., DFD, IDEF0, ERD, and UML)
	Creates a database design
	Designs a simple system architecture and interfaces using familiar technologies
	Compares alternatives for a design and selects the most promising alternative(s), optimising the balance between cost and quality
	Specifies a design for a software application or component , taking into account certain constraints/ requirements (e.g., 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-3]

The learner has demonstrated capability

→ to creatively develop software applications and components, by interpreting the software design

→ to optimise the application development

Unit learning outcomes	Organises data and creates a structured dataset
	Writes code and related documentation to it, using programming languages (e.g., Java, Javascript, PHP, Python) and tools (e.g., GitHub), applying programming principles (e.g., clean coding, green coding, secure programming) and other relevant practices, principles, or constraints (e.g., privacy legislation, intellectual property law)
	Efficiently creates a working software component/ application taking into account design requirements and other relevant constraints (e.g., architecture, efficiency, cost, quality, energy consumption) and applying relevant tools and techniques (e.g., object-oriented programming; IDE, CASE; editors, compilers; version control management and tools; multimedia integration tools; app development tools; reuse of proved solutions)
	Modifies an existing software component/ application , in order to optimize it (e.g., to improve maintenance, performance, security)
	Participates in a development process, selecting and applying appropriate methods and techniques (e.g., a software development method such as agile, prototyping)

3. PLO Component Integration [e-2]

The learner has demonstrated capability

→ to integrate efficiently a software application or component into an existing system

→ to document the installation activities

Unit learning outcomes	Explains and distinguishes common methods, techniques and tools related to efficient integration
	Describes the interplay between and compatibility of system components

Carries out installation and configuration activities, applying common methods, techniques and tools related to efficient integration (e.g., packaging and distribution, virtualisation, containerisation)
Monitors and tests the connectivity of integrated systems
Writes an installation report

4. PLO Testing [e-2]

The learner has demonstrated capability
 → to test a software application or component
 → to document test outcomes

Unit learning outcomes	Explains and distinguishes principles of software testing, common testing methods, techniques, and tools
	Writes an (automated) test on a piece of code
	Performs common test activities, applying testing and debugging techniques and tools
	Records and interprets test outcomes and writes test result documentation/ test report

5. PLO Documentation Production [e-3]

The learner has demonstrated capability
 → to produce different technical documents, taking into account the needs of different populations

Unit learning outcomes	Identifies the needs of different populations regarding software documentation.
	Provides (parts of) relevant technical documents , (e.g., required for designing, developing, and deploying applications and services), in line with identified needs of different audiences, using appropriate tools

6. PLO Problem management [e-3]

The learner has demonstrated capability
 → to systematically resolve incidents and problems
 → to optimise system performance
 → to appraise the impact of a failure on the business

Unit learning outcomes	Monitors the software system (e.g., by using monitoring systems and analytical tools)
	Detects, analyses, and systematically resolves or escalates incidents and problems, resulting in a solved incident (e.g., by applying techniques and tools for troubleshooting such as diagnostic tools; interpreting incident and problem reports; by optimising overall system performance)
	Provides an impact assessment of a failure on the business
	Recommends actions to improve system or component performance

7. PLO Profession related competences [EQF6]

The learner has demonstrated capability
 → to apply profession related skills

Unit learning outcomes	Masters common ICT knowledge
	Explains the principles, related concepts, advantages, disadvantages, limitations and possible societal, environmental, and ethical issues related to the application of a new technology . Applies and reports on basic methods, techniques and tools related to a new technology.
	Applies, evaluates, reports and provides advice on security standards, regulations, measures, methods, tools, and techniques
	Applies, evaluates and provides advice on appropriate methods, tools and techniques related to software lifecycle processes
	Applies, evaluates, reports and provides advice on sustainability standards, regulations, measures, and methods.

Is aware of **ethical considerations** and issues and applies these in professional contexts and activities. Forms and communicates an opinion based on considerations of relevant social, professional, scientific and ethical aspects

8. PLO Soft competences [EQF6]

The learner has demonstrated capability

→ to apply soft skills

Unit learning outcomes	Manages teamwork processes and facilitates collaboration to reach common objectives, e.g., handles conflicts, negotiates, motivates, and persuades.
	Communicates with peers, colleagues, supervisors and or relevant others, specialists and non-specialists, and clients, appropriately to the scientific and professional community, using conventions which are relevant. Applies communication to the objective and the target group.
	Masters the English language at level B2. Can understand the main ideas of complex text on both concrete and abstract topics, including technical discussions in his/her field of specialisation
	Related to the occupation and knowledge domain, critically collects detailed professional and/or scientific information on a limited range of basic theories, principles and concepts, as well as limited information on some important current issues and topics. Analyses , evaluates, and combines critically this information, knowledge and insights and presents this. Critically applies/ translates/ interprets results of research (possibly executed by others) to the own context (the occupation and/or knowledge domain). Executes applied and practice-oriented research.
	Identifies and analyses complex and unpredictable problems. Solves these problems in a tactical, strategic and creative way by selecting and using data and by using one's creativity, flexibility and inventiveness.
	Exercises self-management in complex technical or professional activities or projects, taking responsibility for decision making in unpredictable work or study contexts. Is able to cope with change (positive or negative) and to adapt to a considerable level of variety in the workplace. Handles pressure and setbacks and maintains composure. Shows initiative, creativity and some 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 on one's own initiative, by reflecting on and evaluating personal (learning) results. Selects and uses training/instructional methods and procedures appropriate for the situation when learning.

9. PLO Functioning in organisations [EQF6]

The learner has demonstrated capability

→ to function in an organisational context

Unit learning outcomes	Explains the basics of organisation theory and behaviour
	Describes the relationship between business and IT
	Works in an organisational context under specific direction with limited autonomy and responsibility e.g., at the level of a trainee, junior or assistant
	Manages a project, selects appropriate project management methods and tools
	Writes a report on functioning in organisation

Assessments

Unit learning outcome	Assessment method	Validation of prior acquired competences (skills and knowledge)
1.1	Exam	Certification
1.2	Exam	Certification
1.3	Exam	Certification
1.4	Exam	Certification
1.5	Exam	Certification
1.6	Practical assignment	Assessment (of skills)
1.7	Practical assignment	Assessment (of skills)
1.8	Practical assignment	Assessment (of skills)
2.1	Practical assignment	Assessment (of skills)
2.2	Practical assignment	Assessment (of skills)
2.3	Practical assignment	Assessment (of skills)
2.4	Practical assignment	Assessment (of skills)
2.5	Practical assignment	Assessment (of skills)
3.1	Exam	Certification
3.2	Exam	Certification
3.3	Practical assignment	Assessment (of skills)
3.4	Practical assignment	Assessment (of skills)
3.5	Report	Assessment (of report)
4.1	Exam	Certification
4.2	Practical assignment	Assessment (of skills)
4.3	Practical assignment	Assessment (of skills)
4.4	Report	Assessment (of report)
5.1	Practical assignment	Assessment (of skills)
5.2	Practical assignment	Assessment (of skills)
6.1	Practical assignment	Assessment (of skills)
6.2	Practical assignment	Assessment (of skills)
6.3	Practical assignment	Assessment (of skills)
6.4	Practical assignment	Assessment (of skills)
7.1	Exam	Certification
7.2	Practical assignment	Assessment (of skills)
7.3	Report	Assessment (of report)
8.1	Exam	Certification
8.2	360° assessment	360° assessment
8.3	Practical assignment	Assessment (of skills)
8.4	Practical assignment	Assessment (of skills)
8.5	Practical assignment	Assessment (of skills)
8.6	Exam	Certification
9.1	360° assessment	360° assessment
9.2	360° assessment	360° assessment
9.3	Exam	Certification
9.4	Practical assignment	Assessment (of skills)
9.5	Practical assignment	Assessment (of skills)
9.6	Self-reflection report	Assessment (of report)
10.1	Exam	Certification
10.2	Exam	Certification
10.3	360° assessment	360° assessment
10.4	Report	Assessment (of report)