

COMPETENCY MAP

AI-Enabled Software Engineer Competency Map

These competencies define the knowledge, skills, and abilities software engineers need to responsibly and effectively build, integrate, and operate AI-enabled applications and systems.

KSA Key: K = Knowledge • S = Skill • A = Ability
Proficiency Level: ■□□ Basic ■■□ Medium ■■■ High

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Prerequisite: Software Engineer Foundations

	Competency	KSA	Proficiency
a	Proficient in core software development foundations, including programming principles, data structures and algorithms, system design, testing practices, secure coding, version control, and deployment workflows.	Knowledge / Ability	■ ■ ■ High

Durable Skills

Critical Thinking, Problem Solving & Creativity

	Competency	KSA	Proficiency
a	Question AI-generated outputs and identify basic risks, gaps, or inconsistencies.	Skill	■ ■ ■ High
b	Solve problems using AI tools under guidance.	Skill	■ ■ ■ High
c	Recognize limitations, assumptions, and uncertainty in AI-supported analyses.	Knowledge	■ ■ ■ High
d	Use AI to explore alternative solutions, scenarios, or perspectives.	Skill	■ □ □ Basic
e	Apply creative thinking to reframe problems and identify novel AI-enabled approaches.	Ability	■ □ □ Basic
f	Balance AI-generated recommendations with domain knowledge and human judgment.	Ability	■ ■ ■ High

Collaboration & Communication in AI Context

	Competency	KSA	Proficiency
a	Explain basic AI concepts to peers.	Skill	■ ■ ■ High
b	Collaborate in AI-augmented teams.	Ability	■ ■ □ Medium
c	Maintain transparency about when and how AI is used.	Skill	■ ■ ■ High
d	Support shared understanding and alignment on AI-enabled decisions.	Ability	■ □ □ Basic
e	Understand how different teams function and work effectively across teams to coordinate efforts, share information, and achieve shared goals.	Ability	■ □ □ Basic
f	Share lessons learned and best practices from AI use cases, with peers.	Skill	■ □ □ Basic

	Competency	KSA	Proficiency
g	Advocate for AI learning and responsible experimentation among peers.	Ability	■ □ □ <i>Basic</i>

Adaptability, Continuous Learning, & Curiosity

	Competency	KSA	Proficiency
a	Anticipates evolving global standards for AI transparency, safety, and accountability.	Knowledge	■ □ □ <i>Basic</i>
b	Navigate AI in the workplace: Understand the impact of AI on different industries and future work.	Knowledge	■ □ □ <i>Basic</i>
c	Demonstrates passion for continuous learning, pursuing focused skill development, additional credentials and certificates, and stays current with emerging trends, tools and industry practices.	Ability	■ ■ ■ <i>High</i>
d	Experiment responsibly with new AI tools and methods.	Skill	■ ■ □ <i>Medium</i>

Initiative & Ownership

	Competency	KSA	Proficiency
a	Takes ownership of roadblocks and moving solutions forward, proactively addressing challenges and collaborating across teams to advance progress.	Ability	■ □ □ <i>Basic</i>

AI Literacy & Foundations for Engineers

	Competency	KSA	Proficiency
a	Explain the fundamentals and history of Artificial Intelligence (e.g., large language models, generative AI tools, agentic AI, protocols) including their capabilities, limitations, and appropriate use cases.	Knowledge	■ □ □ <i>Basic</i>
b	Identifies common AI limitations (hallucinations, bias, non-deterministic outputs, context window constraints).	Skill	□ □ □ <i>Not Rated</i>
c	Understand the basic lifecycle and implementation approaches of AI systems, including concepts such as model training, fine-tuning, inference, and when AI models are integrated through APIs.	Knowledge	■ □ □ <i>Basic</i>
d	Understands that AI models vary in their capabilities and are appropriate for different use cases depending on trade-offs such as cost, latency, and reliability.	Knowledge	■ □ □ <i>Basic</i>

	Competency	KSA	Proficiency
e	Understand the importance of following organizational standards for secure authentication and data access when using AI tools and APIs.	Knowledge	■ □ □ <i>Basic</i>
f	Recognizes the ethical implications of working with data and AI and approaches data use with a commitment to responsibility, transparency, and respect for privacy.	Knowledge	■ □ □ <i>Basic</i>

AI-Assisted Development Workflows

	Competency	KSA	Proficiency
a	Understand best practices for how and when to apply AI tools in the software development lifecycle.	Knowledge	■ □ □ <i>Basic</i>
b	Apply AI tools to augment software development productivity (e.g., research, ideation, content generation, and code development to generate, refactor, document, and explain code).	Skill	■ ■ □ <i>Medium</i>
c	Writes structured prompts to produce reliable and maintainable code outputs.	Skill	■ ■ □ <i>Medium</i>
d	Understand how prompting strategies may vary across different use cases, such as code development, generating test cases, or other development tasks.	Knowledge	■ □ □ <i>Basic</i>
e	Reviews and validates AI-generated code for correctness, performance, and security.	Skill	■ ■ □ <i>Medium</i>
f	Understand how to utilize AI assistance into IDEs, workflows, and documentation processes.	Knowledge	■ □ □ <i>Basic</i>
g	Understands how to use AI tools within peer review.	Knowledge	■ □ □ <i>Basic</i>

AI System Design & Integration

AI Application Design & Integration

	Competency	KSA	Proficiency
a	Translates business requirements into clearly scoped AI-enabled features.	Skill	■ □ □ <i>Basic</i>
b	Designs prompts with explicit instructions, constraints, and structured output formats (e.g., JSON schemas).	Skill	■ ■ □ <i>Medium</i>
c	Integrates AI APIs into backend, web, or mobile applications.	Skill	■ ■ □ <i>Medium</i>

	Competency	KSA	Proficiency
d	Implements function calling or structured outputs for downstream system use.	Skill	■ ■ □ <i>Medium</i>
e	Designs AI services as bounded components with defined inputs, outputs, and error handling.	Ability	■ □ □ <i>Basic</i>
f	Documents AI behavior, assumptions, and limitations for maintainability.	Skill	■ ■ □ <i>Medium</i>
g	Understand there are trade-offs among model capability, latency, cost, and reliability.	Knowledge	■ □ □ <i>Basic</i>

Data Management for AI Applications

	Competency	KSA	Proficiency
a	Understands how systems store and exchange data securely.	Knowledge	■ ■ ■ <i>High</i>
b	Connects AI-enabled applications to structured and unstructured enterprise data sources.	Ability	■ □ □ <i>Basic</i>
c	Prepares, formats, and validates contextual data for prompt injection.	Ability	■ ■ □ <i>Basic-Medium</i>
d	Understand retrieval-augmented generation (RAG) using embeddings and vector search at an applied level.	Knowledge	■ □ □ <i>Basic</i>
e	Understand least privileged access (e.g., role-based access control and scoped credentials) to protect sensitive data.	Knowledge	■ □ □ <i>Basic</i>
f	Ensures data accuracy, freshness, and relevance in AI-driven features.	Ability	■ □ □ <i>Basic</i>
g	Understand the importance of data sources, data quality, and how these factors influence AI outputs and reliability.	Knowledge	■ ■ □ <i>Medium</i>

AI Safety, Quality Assurance & Operations

AI Safety & Governance

	Competency	KSA	Proficiency
a	Ask informed questions about AI governance including how policies and standards apply within their organization or industry.	Ability	■ □ □ <i>Basic</i>
b	Awareness of regulatory considerations relevant to the company/industry.	Knowledge	■ □ □ <i>Basic</i>
c	Logs prompts, responses, and system actions to support traceability and auditability.	Ability	■ ■ □ <i>Medium</i>

	Competency	KSA	Proficiency
d	Incorporates AI-enabled workflows that incorporate structured human-in-the-loop approval flows for sensitive or high-impact decisions.	Ability	■ □ □ <i>Basic</i>
e	Prevent data leakage, exposure of PII, and improper use of proprietary information by applying data privacy practices (e.g., redaction, encryption, least-privilege access) and integrate policy guardrails.	Knowledge	■ ■ ■ <i>High (Industry Dependent)</i>

AI Quality Assurance

	Competency	KSA	Proficiency
a	Defines measurable success criteria for AI features (accuracy, relevance, response time, cost).	Skill	■ □ □ <i>Basic</i>
b	Designs structured test cases and evaluation datasets for AI output validation.	Skill	■ ■ □ <i>Medium</i>
c	Identifies and mitigates hallucinations, bias, and unsafe outputs.	Skill	■ ■ □ <i>Medium</i>
d	Ensures input validation and output moderation controls.	Skill	■ ■ □ <i>Medium</i>

AI Operations & Production Management

	Competency	KSA	Proficiency
a	Deploys AI-enabled services using standard DevOps practices (containers, CI/CD pipelines).	Skill	■ □ □ <i>Basic</i>
b	Apply prompt, context, and harness engineering best practices.	Skill	■ ■ □ <i>Medium</i>
c	Monitors token usage, API latency, error rates, and operational cost.	Skill	■ □ □ <i>Basic</i>
d	Implements caching and optimization strategies to reduce redundancy and improve performance.	Skill	■ □ □ <i>Basic</i>
e	Conducts load testing, system resiliency, and performance tuning under realistic traffic conditions.	Skill	■ □ □ <i>Basic</i>
f	Configures monitoring and alerting for AI-related failures or anomalies.	Skill	■ □ □ <i>Basic</i>

Business Alignment & Product Thinking

	Competency	KSA	Proficiency
a	Identifies appropriate use cases for AI versus traditional software logic.	Ability	■ ■ ■ <i>Very High</i>
b	Defines scope, risks, and success metrics for AI-enabled functionality.	Ability	■ ■ ■ <i>High</i>
c	Estimates cost, effort, and performance trade-offs when integrating AI features.	Knowledge	■ □ □ <i>Basic</i>
d	Communicates AI capabilities, limitations, and risks to internal and external stakeholders.	Knowledge	■ □ □ <i>Basic</i>
e	Understands AI-driven value (efficiency gains, quality improvements, user experience).	Knowledge	■ □ □ <i>Basic</i>
f	Iteratively improves AI features based on user feedback and performance data.	Skill	■ □ □ <i>Basic</i>
g	Understands how AI services are delivered via cloud APIs and managed platforms.	Knowledge	■ □ □ <i>Basic</i>

Agentic & Autonomous AI Systems

	Competency	KSA	Proficiency
a	Understands how multi-step AI workflows (e.g., planner to executor to reviewer patterns) extend beyond single-prompt integrations.	Ability	■ ■ ■ <i>High</i>
b	Recognizes how orchestration frameworks enable coordinated reasoning, retrieval, and tool use.	Knowledge	■ ■ ■ <i>High</i>
c	Understands how AI systems can invoke external APIs and enterprise tools within structured workflows.	Knowledge	■ □ □ <i>Basic</i>
d	Is aware of challenges related to agent memory, state management, and multi-step context persistence.	Knowledge	■ □ □ <i>Basic</i>
e	Recognizes the need for system-level guardrails, monitoring, and human oversight in autonomous workflows.	Knowledge	■ ■ ■ <i>High</i>
f	Tracks emerging practices in model customization, alignment, and agent performance optimization.	Ability	■ □ □ <i>Basic</i>