

AI for Programming

Speed Up R&D - 1 day

FA-0483 · 1 day

Agentic & Generative AI · Software Development · DevOps, Cloud & Infrastructure · Data & Analytics · Mainframe & Enterprise Systems

Introduction

Empower code, debug, and design with AI as your co-pilot

In the modern software development landscape, efficiency and adaptability are crucial. Artificial Intelligence is not a distant concept — it is now a deeply practical tool that accelerates research, design, and development cycles. Whether you are optimizing a .NET microservice or maintaining RPG logic on an AS/400, AI can assist in ideation, code generation, refactoring, and debugging.

This course focuses on applying AI *as an engineering partner*, not a replacement for expertise. Participants will learn how to communicate effectively with LLMs, embed AI into real systems, and orchestrate development workflows that merge human insight with machine intelligence. The instructor — bringing over 30 years of software and systems experience — ensures that every topic connects directly to real industry needs, not academic abstraction.

Important Disclaimers

- **Rapid Evolution of AI Tools and Techniques** The AI ecosystem evolves continuously — APIs, SDKs, local models, and IDE extensions are updated frequently. Therefore, this outline serves as a **guideline framework**. The instructor may adjust content, tools, and demonstrations to align with the latest stable and practical technologies available at the time of delivery.
- **Dependence on Technical Setup and Environment** This training relies heavily on a properly configured **lab setup**, including AI API access, local LLM runtimes, Visual Studio Code, .NET SDK, and TN5250 connectivity for RPG. Any restrictions, such as lack of internet access, firewall rules, or hardware limitations, may require adjustments to demonstrations or exercises. Participants or IT teams are advised to coordinate setup readiness **before** the training to ensure a smooth hands-on experience.

Learning outcomes

By the end of this intensive one-day workshop, participants will be able to:

- Understand the role of modern LLMs in accelerating R&D within software projects.
 - Design effective prompts (including chain-of-thought and tree-of-thought) for coding, debugging, and system planning.
 - Leverage AI coding assistants inside VS Code for C#/.NET 8 development.
 - Integrate cloud-based and on-premise LLMs into .NET and AS/400 workflows.
 - Automate test creation, error analysis, and feature decomposition using AI reasoning.
 - Apply secure and maintainable methods for embedding AI APIs into enterprise codebases.
 - Modernize RPG systems by bridging them with .NET-based AI integration layers.
 - Assess and mitigate risks such as hallucination, data exposure, and dependency on third-party AI platforms.
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Prerequisites

- Strong programming foundation in **C# / .NET (6/7/8)**
 - Familiarity with **Visual Studio Code** and **REST API** concepts
 - Access to **.NET SDK**, **Docker**, and (optionally) GPU/CPU-based LLM runtime environments
 - Basic understanding of **RPG programming** and experience using **TN5250** for AS/400 connectivity
 - Internet access for API integration demos (if applicable)
 - Willingness to experiment and iterate through prompts and AI interactions
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Training outline

1. 1. AI Foundations for Modern Developers

- How LLMs understand and generate code
 - Overview of top AI models and where they excel
 - Use cases: from code generation to architecture planning
 - Recognizing and mitigating AI limitations (hallucinations, bias, context overflow)
 - Security and intellectual property considerations in enterprise codebases
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2. 2. Prompt Engineering Masterclass

- Prompt structure and hierarchy: instruction, context, examples, constraints specifically for coding
- Zero-shot, few-shot, and role-based prompting
- Contexting techniques for coding
- Project definition techniques
- Planing flows and and forks
- Chain-of-thought (CoT) and tree-of-thought (ToT) reasoning methods
- Using "self-critique" and verification loops in AI workflows

Practical prompt templates for:

- Bug fixing and diagnostics
 - Unit test generation
 - Refactoring suggestions
 - Task decomposition and planning
- Tools for managing prompts and experiments (PromptFlow, PromptLayer, LangSmith)
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3. 3. Using AI Coding Assistants in VS Code

- Setup and configuration of Copilot, Tabnine, and other modern assistants
- Prompting inside code comments effectively
- Evaluating AI-generated code quality and safety

Real-world demos:

- Refactoring a C# service with Copilot
 - Using AI to write test cases and documentation
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4. 4. Integrating LLM APIs into .NET Applications

- Overview of LLM API structures (chat completions, embeddings, function calls)
 - Using **Microsoft.Extensions.AI** abstraction for unified model integration
 - Implementing **OpenAI** and **Azure OpenAI** endpoints in .NET
 - Handling tokens, throttling, caching, and cost optimization
 - Demonstration: build a small AI-enhanced API endpoint in C#
 - Logging and evaluating prompt-response cycles for improvement
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5. 5. Local and Private LLM Integration

- Why and when to run local models (privacy, compliance, cost)
 - Using **LLaMaSharp** and **OllamaSharp** in C# for local inference
 - Leveraging **Microsoft Semantic Kernel** for orchestration and RAG pipelines
 - Running hybrid (local + cloud fallback) AI strategies
 - Example: embedding a local inference call in a .NET service
 - Performance tuning and quantization options
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6. 6. AI for Planning, Debugging, and Decomposition

- Using AI to transform business requirements into development tasks
 - Prompting for system design and module architecture
 - Debugging with AI: analyzing logs, stack traces, and error messages
 - Automated test case and regression test generation
 - Self-evaluation: comparing AI suggestions vs. developer insights
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7. 7. Modernizing RPG and AS/400 with AI*

- Building bridges between RPG logic and .NET layers
 - Creating service wrappers for RPG functions via APIs
 - Using AI to generate code adapters, data models, and migration scaffolds
 - Applying AI for documentation and modernization of legacy systems
 - Integrating .NET AI services with TN5250 and AS/400 backends
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*Subject to lab availability and participant skillsets