

# Secure Web Application Engineering: OWASP & CWE in Practice

Applied Technology Academy

A two-day course on recognizing, preventing and responding to common web application weaknesses across the software lifecycle. It uses OWASP Top 10:2025 risk themes and CWE Top 25:2025 weakness patterns as a shared language, but organizes the learning around durable engineering practice rather than a checklist that ages quickly. Lecture, code analysis, demonstrations and case studies show both the vulnerable pattern and the practical defensive alternative across common web frameworks.

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|-----------------------------------------------------|----------------------------------|------------------------------------------|
| <b>LEVEL</b><br><b>Foundational to Intermediate</b> | <b>DURATION</b><br><b>2 Days</b> | <b>DELIVERY</b><br><b>Instructor-led</b> |
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## Course Overview

- Two days of lecture, code analysis and follow-along demonstrations.
- OWASP Top 10:2025 and CWE Top 25:2025 used to communicate and prioritize risk.
- Examples span C#/ASP.NET Core, Java/Spring and Python/Flask - no single language is required.
- Covers the full arc: secure design, identity, access control, input handling, dependencies, configuration, integrity, logging and incident-ready engineering.

## Course Outline

- **Day One: Foundations, Design, Identity and Input Security**
- **Module 1. Application Security Context and Ethical Bug Hunting**
  - Security terminology, the exploit lifecycle, remote code execution, web shells and supply-chain attacks.
  - Current breach patterns: vulnerability exploitation, credential misuse, ransomware and the human element.
  - Developer lessons from real incidents, including the MOVEit Transfer compromise.
  - Authorization, scope, privacy, professional conduct and safe testing practice.
- **Module 2. Fingerprinting and Risk Prioritization**
  - How attackers identify platforms, versions, configurations and database technologies.
  - Banner grabbing, injection probing, timing analysis, error analysis and metadata discovery.
  - Information-exposure risk, practical mitigations, and prioritizing with OWASP and CWE.
- **Module 3. Secure Design and Threat Modeling**
  - Security across the development lifecycle; n-tier architecture and framework security features.
  - Threat-modeling workflow and STRIDE analysis.

- Attack-surface analysis, trust boundaries, defense in depth, secure defaults and least privilege.
- Demonstration: threat modeling a representative web application.
- **Module 4. Asset Management, Data Protection and Validation**
  - Asset discovery, data classification and regulatory considerations.
  - Cryptographic failures, hard-coded credentials, TLS configuration and certificate management.
  - Key and secret management; boundary validation and framework input/output validation patterns.
- **Module 5. Authentication and Session Management**
  - Secure authentication patterns, password storage, hashing and account recovery.
  - Multi-factor authentication, TOTP and WebAuthn/FIDO2.
  - Secure cookies, session timeout, rotation and fixation prevention; rate limiting and logout.
- **Module 6. Access Control and Authorization**
  - Broken, missing and incorrect authorization; role-based and attribute-based patterns.
  - Forceful browsing, exposed administrative interfaces, backup files and test environments.
  - Insecure direct object references across pages, APIs, documents and file paths.
  - Cross-site request forgery flows, framework defenses and privilege-escalation prevention.
- **Module 7. Injection, Input Validation and Output Encoding**
  - SQL injection with parameterized query and ORM defenses; OS command injection.
  - Reflected, stored and DOM-based XSS; contextual encoding and Content Security Policy.
  - Path traversal and server-side request forgery.
  - Positive validation, encodings, rich text, file uploads and well-vetted regular expressions.
- **Day Two: Hardening, Supply Chain, Runtime Defense and Emerging Risk**
- **Module 8. Memory Safety, Resource Management and Error Handling**
  - Out-of-bounds access, buffer weaknesses, integer overflow and null-pointer risk.
  - Resource limits and protection against uncontrolled resource consumption.
  - Exception handling, safe user-facing errors and preventing sensitive-information exposure.
- **Module 9. Security Configuration and Application Hardening**
  - Security misconfiguration and the secure-defaults principle.
  - Framework hardening examples for Spring Boot and Flask; security headers.
  - Container security scanning, resource controls and reviewable configuration management.
- **Module 10. Dependency and Software Supply-Chain Security**
  - Supply-chain failures and the dependency-management lifecycle.
  - Software composition analysis and software bills of materials.
  - CVE, NVD, GitHub Security Advisories, OSV and commercial feeds; patch and rollback paths.
- **Module 11. Software and Data Integrity**
  - Integrity failures in code, updates, plugins, CI/CD pipelines and trusted data flows.

- Code-injection risk from dynamic evaluation, and safer alternatives.
- Insecure deserialization, constrained data binding and XML external entity risk.
- **Module 12. Security Logging, Alerting and Runtime Response**
  - Logging and alerting failures and their impact on detection, response and forensics.
  - What to capture: validation and authentication failures, authorization denials, unusual access.
  - Actionable alerts with identity, target, outcome, risk and correlation context.
  - Application-layer response: step-up authentication, session revocation, throttling and lockout.
- **Module 13. Tools, Compliance and Continuous Improvement**
  - Framework-specific security responsibilities and implementation review.
  - Static analysis, dynamic testing, dependency scanning, vulnerability scanning and penetration testing.
  - Using OWASP, CWE, CVE, NIST and vendor advisories to keep practice current.
- **Module 14. Emerging Security Technologies (optional)**
  - Quantum-computing timelines and risk to current public-key cryptography.
  - Post-quantum cryptography, NIST standards, cryptographic inventory and phased migration.
  - AI-assisted scanning, code review and incident response, and the limits of each.

## Prerequisites

- No prior application-security, penetration-testing or secure-coding experience is required.
- Basic familiarity with web applications: browser-to-server requests, APIs, databases, authentication and sessions.
- Familiarity with at least one server-side language is useful; participants are not expected to write production code in class.
- A general understanding of software-development and deployment workflows is recommended.
- No special tooling is required for the standard lecture and demonstration delivery.

## Who Should Attend

- Web and software developers, senior developers and technical leads.
- Software and solution architects.
- Application-security engineers, security analysts and security champions.
- QA engineers, test-automation specialists, DevOps, platform and site-reliability teams.
- Engineering managers, product owners and other stakeholders responsible for application risk.

## What You'll Learn

By the end of this course, participants will be able to:

- connect attacker behavior to concrete defenses at each trust boundary

- use OWASP Top 10:2025 and CWE Top 25:2025 to communicate and prioritize risk
- run a threat-modeling workflow using STRIDE, attack-surface and data-flow analysis
- classify sensitive data and apply encryption at rest and in transit correctly
- implement secure authentication, MFA, session handling and anti-automation controls
- prevent broken access control, IDOR, forceful browsing and cross-site request forgery
- defend against SQL injection, command injection, XSS, path traversal and SSRF
- harden framework configuration and apply security headers and container controls
- manage dependency and supply-chain risk with SCA, SBOMs and advisory feeds
- design security logging and alerting that supports detection, response and forensics

## Hands-On Work

Demonstrations participants can follow:

- threat modeling a representative web application
- asset classification and asset analysis
- weak and strengthened authentication flows
- insecure direct object reference and cross-site request forgery
- SQL injection and cross-site scripting
- dependency and package checking
- XML external entity exploitation and mitigation

**Ready to enroll?** Call 800.674.3550 or email Info@AppliedTechAc.com — private team cohorts, GSA MAS purchasing, military credentialing funding, VA GI Bill and VR&E and student financing available.