Desktop Application Security in Python

Category: Networking & Security | **Vendor:** Various

Duration: 24.00 hours (3 days) **19.5 CPD Hours** **Rating:** ⭐ 4.6 (5,878 reviews)

Course Information

Delivery Format: Instructor Led - Online

Course Overview

Your application written in Python works as intended, so you are done, right? But did you consider feeding in incorrect values? 16Gbs of data? A null? An apostrophe? Negative numbers, or specifically -1 or -231? Because that’s what the bad guys will do – and the list is far from complete.

Handling security needs a healthy level of paranoia, and this is what this course provides: a strong emotional engagement by lots of hands on labs and stories from real life, all to substantially improve code hygiene. Mistakes, consequences, and best practices are our blood, sweat and tears.

All this is put in the context of Python, and extended by core programming issues, discussing security pitfalls of the programming language.

So that you are prepared for the forces of the dark side.

So that nothing unexpected happens.

Nothing.

About This Course

- Cyber security basics
- Input validation
- Security features
- Using vulnerable components
- Cryptography for developers
- Common software security weaknesses
- Wrap up

Who Should Attend

Python developers working on desktop applications

Prerequisites & Entry Requirements

General Prerequisites:

General Python development

Learning Outcomes

Upon successful completion of this course, participants will be able to:

- Getting familiar with essential cyber security concepts
- Identify vulnerabilities and their consequences
- Learn the security best practices in Python
- Input validation approaches and principles
- Managing vulnerabilities in third party components
- Understanding how cryptography can support appplication security
- Learning how to use cryptographic APIs correctly in Python

Detailed Course Outline

DAY 1

Cyber security basics

- What is security?
- Threat and risk
- Cyber security threat types
- Consequences of insecure software

- Constraints and the market
- The dark side

Input validation

- Input validation principles

- Blacklists and whitelists
- Data validation techniques
- Lab – Input validation
- What to validate – the attack surface
- Where to validate – defense in depth
- How to validate – validation vs transformations
- Output sanitization
- Encoding challenges
- Lab – Encoding challenges
- Validation with regex
- Regular expression denial of service (ReDoS)
- Lab – Regular expression denial of service (ReDoS)
- Dealing with ReDoS
- Injection

- Injection principles
- Injection attacks
- SQL injection

- SQL injection basics
- Lab – SQL injection
- Attack techniques
- Content-based blind SQL injection
- Time-based blind SQL injection
- SQL injection best practices

- Input validation
- Parameterized queries
- Additional considerations
- Lab – SQL injection best practices
- Case study – Hacking Fortnite accounts
- Code injection

- Code injection via input()

- OS command injection

- Lab – Command injection

- OS command injection best practices

- Avoiding command injection with the right APIs

- Lab – Command injection best practices

- Case study – Shellshock

- Lab – Shellshock

- Case study – Command injection via ping

- Python module hijacking

- Lab – Module hijacking

- General protection best practices

DAY 2

Input validation

- Integer handling problems

- Representing signed numbers

- Integer visualization

- Integers in Python

- Integer overflow

- Integer overflow with ctypes and numpy

- Lab – Integer problems in Python

- Other numeric problems

- Division by zero

- Other numeric problems in Python

- Working with floating-point numbers

- Files and streams

- Path traversal
- Path traversal-related examples
- Lab – Path traversal
- Additional challenges in Windows
- Virtual resources
- Path traversal best practices
- Format string issues
- Unsafe native code

- Native code dependence
- Lab – Unsafe native code
- Best practices for dealing with native code

Security features

- Authentication

- Authentication basics
- Multi-factor authentication
- Authentication weaknesses – spoofing
- Case study – PayPal 2FA bypass
- Password management

- Inbound password management

- Storing account passwords
- Password in transit
- Lab – Is just hashing passwords enough?
- Dictionary attacks and brute forcing

- Salting
- Adaptive hash functions for password storage
- Password policy

- NIST authenticator requirements for memorized secrets
- Password length
- Password hardening
- Using passphrases
- Password change
- Forgotten passwords
- Lab – Password reset weakness
- Case study – The Ashley Madison data breach

- The dictionary attack
- The ultimate crack
- Exploitation and the lessons learned
- Password database migration
- Outbound password management

- Hard coded passwords
- Best practices
- Lab – Hardcoded password
- Protecting sensitive information in memory

- Challenges in protecting memory
- Information exposure

- Exposure through extracted data and aggregation
- Case study – Strava data exposure
- System information leakage

- Leaking system information

- Information exposure best practices

- Python platform security

- The Python ecosystem and its attack surface

- Python bytecode and security

- Security features offered by the Python runtime

- PEP 578 and audit hooks

- Sandboxing Python

Using vulnerable components

- Assessing the environment

- Hardening

- Malicious packages in Python

- Vulnerability management

- Patch management

- Bug bounty programs

- Vulnerability databases

- Vulnerability rating – CVSS

- DevOps, the build process and CI / CD

- Dependency checking in Python

- Lab – Detecting vulnerable components

DAY 3

Cryptography for developers

- Cryptography basics

- Cryptography in Python

- Elementary algorithms

- Random number generation

- Pseudo random number generators (PRNGs)
- Cryptographically strong PRNGs
- Using virtual random streams
- Weak and strong PRNGs
- Using random numbers in Python
- Case study – Equifax credit account freeze
- Lab – Using random numbers in Python
- Hashing

- Hashing basics
- Common hashing mistakes
- Hashing in Python
- Lab – Hashing in Python
- Confidentiality protection

- Symmetric encryption

- Block ciphers
- Modes of operation
- Modes of operation and IV – best practices
- Symmetric encryption in Python
- Lab – Symmetric encryption in Python
- Asymmetric encryption

- The RSA algorithm

- Using RSA – best practices
- RSA in Python

- Elliptic Curve Cryptography

- The ECC algorithm
- Using ECC – best practices
- ECC in Python
- Combining symmetric and asymmetric algorithms

- Key exchange
- Diffie-Hellman key agreement algorithm
- Key exchange pitfalls and best practices
- Integrity protection

- Authenticity and non-repudiation
- Message Authentication Code (MAC)

- MAC in Python
- Lab – Calculating MAC in Python
- Digital signature

- Digital signature with RSA
- Digital signature with ECC
- Digital signature in Python
- Public Key Infrastructure (PKI)

- Some further key management challenges
- Certificates

- Chain of trust
- PGP – Web of Trust
- Certificate management – best practices

Common software security weaknesses

- Time and state

- Race conditions

- File race condition

- Time of check to time of usage – TOCTTOU
- Insecure temporary file
- Avoiding race conditions in Python

- Thread safety and the Global Interpreter Lock (GIL)
- Case study: TOCTTOU in Calamares
- Errors

- Error and exception handling principles
- Error handling

- Returning a misleading status code
- Information exposure through error reporting
- Exception handling

- In the except,catch block. And now what?
- Empty catch block
- The danger of assert statements
- Lab – Exception handling mess
- Code quality

- Language elements

- Using dangerous language elements
- Using obsolete language elements
- Portability flaw

- Module injection and monkey patching

- Dangers of compile(), exec() and eval()

- Sandboxing Python

- Denial of service

- Denial of Service

- Resource exhaustion

- Cash overflow

- Flooding

- Algorithm complexity issues

Wrap up

- Secure coding principles

- Principles of robust programming by Matt Bishop

- Secure design principles of Saltzer and Schröder

- And now what?

- Software security sources and further reading

- Python resources

Skills You Will Learn:

- Getting familiar with essential cyber security concepts
- Identify vulnerabilities and their consequences
- Learn the security best practices in Python
- Input validation approaches and principles
- Managing vulnerabilities in third party components
- Understanding how cryptography can support appplication security
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Frequently Asked Questions

Q: What delivery options are available for Desktop Application Security in Python?

We offer multiple delivery formats:

- Live Instructor-Led Classroom Online (Virtual/Live Online)
- Traditional Instructor-Led Classroom Training (ILT)
- On-site delivery at your offices anywhere in United Kingdom
- Private dedicated courses customized for your team

Q: How many CPD hours does this course provide?

The 3-day Desktop Application Security in Python course provides up to 19.5 CPD hours of structured learning. CPD certificates can be provided upon request.

Q: What is the duration of the Desktop Application Security in Python training?

The training takes place over 3 day(s), with each day lasting approximately 24.00 hours including breaks for lunch and refreshments.

Q: Do you provide corporate training for Desktop Application Security in Python?

Yes, we provide corporate training, dedicated training, and closed classes for Desktop Application Security in Python. Training can take place anywhere in United Kingdom including London, Manchester, Birmingham, Edinburgh, or live online allowing teams from across United Kingdom or internationally to attend.

Q: What related terms do people search for?

Popular related searches include: Desktop Application Security in Python, Desktop Application Security, DASEC-PY

Q: Why choose Nexus Human for Desktop Application Security in Python?

Nexus Human is recognized as one of the leading training providers. Our trainers have won multiple awards including:

- Small Firms Best Trainer Award
- National Training Partner of the Year (Ireland) - Multiple Years
- Global Top 30 Instructor Awards (2012, 2019, 2021)
- Tech Excellence Award Nominations
- Learning Performance Institute (LPI) External Training Provider Sponsor 2024

Q: Are there any discount codes available?

Yes! Use discount code **PENPAL5** when booking your Desktop Application Security in Python training. Please note that only one discount code can be used per booking and cannot be combined with other special offers.

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