

uCertify

Course Outline

Enhancing IoT Security



24 May 2025

1. Exercises, Quizzes, Flashcards & Glossary

Number of Questions

2. Expert Instructor-Led Training

3. ADA Compliant & JAWS Compatible Platform

4. State of the Art Educator Tools

5. Award Winning Learning Platform (LMS)

6. Chapter & Lessons

Syllabus

Chapter 1: Introduction

Chapter 2: The Internet of Things and its Security Requirements

Chapter 3: IoT Security - Vulnerabilities, Attacks, and Countermeasures

Chapter 4: Security Engineering for IoT Development

Chapter 5: IoT Security Lifecycle

Chapter 6: IoT as Interconnection of Threats

Chapter 7: Crypto Foundations I

Chapter 8: Crypto Foundations II

Chapter 9: Privacy Preservation for the Internet of Things

Chapter 10: Location Privacy Enhancement in the Internet of Vehicles

Chapter 11: Privacy Protection in Key Personal IoT Applications

Chapter 12: Trust and Trust Models for the IoT

Chapter 13: Framework for Privacy and Trust in IoT

Chapter 14: Preventing Unauthorized Access to Sensor Data and Authentication in IoT

Chapter 15: Computational Security for the IoT and Beyond

Chapter 16: Identity and Access Management Solutions for the IoT

Chapter 17: Privacy-Preserving Time Series Data Aggregation for IoT

Chapter 18: Path Generation Scheme for Real-Time Green IoT

Chapter 19: Security Protocols for IoT Access Networks and Their Impact on Mobile Networks

Chapter 20: Cloud Security for the IoT

Chapter 21: Policy-Based Approaches for Informed Consent in IoT

Chapter 22: Blockchains for Internet of Things

Chapter 23: Game Theory Foundation

Chapter 24: Security Products

Videos and How To

1. Quiz

Quizzes test your knowledge on the topics of the exam when you go through the course material. There is no limit to the number of times you can attempt it.

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QUIZ

2. flashcards

Flashcards are effective memory-aiding tools that help you learn complex topics easily. The flashcard will help you in memorizing definitions, terminologies, key concepts, and more. There is no limit to the number of times learners can attempt these. Flashcards help master the key concepts.

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FLASHCARDS

3. Glossary of terms

uCertify provides detailed explanations of concepts relevant to the course through Glossary. It contains a list of frequently used terminologies along with its detailed explanation. Glossary defines the key terms.



4. **Expert Instructor-Led Training**

uCertify uses the content from the finest publishers and only the IT industry's finest instructors. They have a minimum of 15 years real-world experience and are subject matter experts in their fields. Unlike a live class, you can study at your own pace. This creates a personal learning experience and gives you all the benefit of hands-on training with the flexibility of doing it around your schedule 24/7.

5. **ADA Compliant & JAWS Compatible Platform**

uCertify course and labs are ADA (Americans with Disability Act) compliant. It is now more accessible to students with features such as:

- Change the font, size, and color of the content of the course
- Text-to-speech, reads the text into spoken words
- Interactive videos, how-tos videos come with transcripts and voice-over
- Interactive transcripts, each word is clickable. Students can clip a specific part of the video by clicking on a word or a portion of the text.

JAWS (Job Access with Speech) is a computer screen reader program for Microsoft Windows that reads the screen either with a text-to-speech output or by a Refreshable Braille display. Student can easily navigate uCertify course using JAWS shortcut keys.

6. State of the Art Educator Tools

uCertify knows the importance of instructors and provide tools to help them do their job effectively. Instructors are able to clone and customize course. Do ability grouping. Create sections. Design grade scale and grade formula. Create and schedule assessments. Educators can also move a student from self-paced to mentor-guided to instructor-led mode in three clicks.

7. Award Winning Learning Platform (LMS)

uCertify has developed an award winning, highly interactive yet simple to use platform. The SIIA CODiE Awards is the only peer-reviewed program to showcase business and education technology's finest products and services. Since 1986, thousands of products, services and solutions have been recognized for achieving excellence. uCertify has won CODiE awards consecutively for last 7 years:

- **2014**

1. Best Postsecondary Learning Solution

- **2015**

1. Best Education Solution
2. Best Virtual Learning Solution
3. Best Student Assessment Solution
4. Best Postsecondary Learning Solution
5. Best Career and Workforce Readiness Solution
6. Best Instructional Solution in Other Curriculum Areas
7. Best Corporate Learning/Workforce Development Solution

- **2016**

1. Best Virtual Learning Solution
2. Best Education Cloud-based Solution
3. Best College and Career Readiness Solution
4. Best Corporate / Workforce Learning Solution
5. Best Postsecondary Learning Content Solution

6. Best Postsecondary LMS or Learning Platform
7. Best Learning Relationship Management Solution

- **2017**

1. Best Overall Education Solution
2. Best Student Assessment Solution
3. Best Corporate/Workforce Learning Solution
4. Best Higher Education LMS or Learning Platform

- **2018**

1. Best Higher Education LMS or Learning Platform
2. Best Instructional Solution in Other Curriculum Areas
3. Best Learning Relationship Management Solution

- **2019**

1. Best Virtual Learning Solution
2. Best Content Authoring Development or Curation Solution
3. Best Higher Education Learning Management Solution (LMS)

- **2020**

1. Best College and Career Readiness Solution
2. Best Cross-Curricular Solution
3. Best Virtual Learning Solution

8. Chapter & Lessons

uCertify brings these textbooks to life. It is full of interactive activities that keeps the learner engaged. uCertify brings all available learning resources for a topic in one place so that the learner can efficiently learn without going to multiple places. Challenge questions are also embedded in the chapters so learners can attempt those while they are learning about that particular topic. This helps them grasp the concepts better because they can go over it again right away which improves learning.

Learners can do Flashcards, Exercises, Quizzes and Labs related to each chapter. At the end of every lesson, uCertify courses guide the learners on the path they should follow.

Syllabus

Chapter 1: Introduction

Chapter 2: The Internet of Things and its Security Requirements

- Internet of Things - A brief introduction
- Networking in the IoT device - The framework
- Need to secure IoT - Its limitations
- Cyber security versus IoT security and cyber-physical systems
- IoT architecture
- Authorization and authentication requirement in IoT
- Security in enabling technologies behind the Internet of Things
- IoT networking protocols and its security
- Domain-specific IoT and its security concerns
- IoT supporting technologies
- Conclusion

Chapter 3: IoT Security - Vulnerabilities, Attacks, and Countermeasures

- Introduction
- Information Assurance: components

- Threats
- Vulnerabilities
- Risk
- Insecure Access control
- Attacks: types, composition, and tools
- Threat modeling for IoT systems
- Conclusion

Chapter 4: Security Engineering for IoT Development

- Introduction
- Building Security into design and development
- The IoT security life cycle: Secure design
- Conclusion

Chapter 5: IoT Security Lifecycle

- Introduction
- Phase 2: Implementation and Integration
- Phase 3: Operations and maintenance
- Phase 4: Dispose

Chapter 6: IoT as Interconnection of Threats

- Sybil attack detection in vehicular network
- Malware Propagation and control in Internet of Things
- Solution-based analysis of attack vectors on smart home systems
- Network robustness of the Internet of Things
- Conclusion

Chapter 7: Crypto Foundations I

- Cryptography and its role in securing the IoT
- Cryptography and its primitives in the IoT
- Secrecy and secret-key capacity in IoT
- Encryption and decryption
- Conclusion

Chapter 8: Crypto Foundations II

- Message integrity- Hash functions and their security
- Message authentication
- Random number generation

- Cipher suites
- Signature algorithm means of IoT node authentication
- Cryptographic key management
- Examining cryptographic controls for IoT protocols
- Transport encryption
- Conclusion

Chapter 9: Privacy Preservation for the Internet of Things

- Privacy preservation
- Classification of privacy threats in IoT
- Privacy preservation techniques
- Futuristic approach of privacy preservation data dissemination
- Privacy preservation for IoT used in smart buildings- A case study
- Conclusion

Chapter 10: Location Privacy Enhancement in the Internet of Vehicles

- Location privacy and its requirements in IoV
- Traditional location-privacy preservation solutions
- A new location-privacy preservation scheme: A MixGroup approach

- Conclusion

Chapter 11: Privacy Protection in Key Personal IoT Applications

- Concept of personal IoT
- Security aspect of personal IoT
- Conclusion

Chapter 12: Trust and Trust Models for the IoT

- Concept of trust and its role in securing IoT
- A brief study on Trust Management System
- Classification of Trust Management Systems in IoT network
- Challenges in existing trustable IoT techniques
- Introducing Nova-Genesis as an IoT architecture
- Conclusion

Chapter 13: Framework for Privacy and Trust in IoT

- The concept of user-centric Internet of Things
- Issues in user-centric Internet of Things
- SocIoTal- A socially aware citizen-centric Internet of Things
- Conclusion

Chapter 14: Preventing Unauthorized Access to Sensor Data and Authentication in IoT

- The idea of cooperation in IoT
- The practical implementation of cooperative authentication
- Bargaining-based dynamic game model for cooperative authentication
- Analysis of dynamic game model for cooperative authentication
- Variants of entity authentication
- Message authentication: content delivery in VANET
- Conclusion

Chapter 15: Computational Security for the IoT and Beyond

- An introduction to computational models and their security
- Complex systems
- Examples of complex systems with their security characteristics
- Computational tools for complex systems
- Future scope
- Conclusion

Chapter 16: Identity and Access Management Solutions for the IoT

- Introduction to identity and access management for the IoT
- The identity lifecycle
- Authentication credentials
- IoT IAM infrastructure
- Authorization and access control
- Conclusion

Chapter 17: Privacy-Preserving Time Series Data Aggregation for IoT

- Data aggregation on IoT system
- Time-series data aggregation privacy preservation scheme
- Conclusion

Chapter 18: Path Generation Scheme for Real-Time Green IoT

- Green Internet of Things: An introduction
- Real-time GIOT and its issues
- Real-time query processing in the Green Internet of Things
- Conclusion

Chapter 19: Security Protocols for IoT Access Networks and Their Impact on Mobile Networks

- Existing security features of IoT protocols
- Futuristic security protocol/algorithm for IoT network
- Impact of IoT security on mobile networks
- Conclusion

Chapter 20: Cloud Security for the IoT

- Cloud services and the IoT
- IoT threats from the perspective of cloud security
- Exploring cloud service provider IoT offerings
- Cloud IoT security controls
- An enterprise IoT cloud security architecture
- New directions in cloud-enabled IOT computing
- Conclusion

Chapter 21: Policy-Based Approaches for Informed Consent in IoT

- Informed consent
- A policy-based solution for informed consent in IoT
- Conclusion

Chapter 22: Blockchains for Internet of Things

- Blockchain technology: The introduction
- Crypto-currencies
- Bitcoin P2P network
- Distributed consensus
- Smart contracts
- Blockchain wallets
- Altcoins
- Anonymity
- Conclusion

Chapter 23: Game Theory Foundation

- Introduction to Game-Theoretic approach
- Best response and Nash equilibrium
- Mixed-strategy or randomized-strategy
- Repeated games
- Bayesian games
- Coalitional games
- Conclusion

Chapter 24: Security Products

- Existing IoT security products
- Testbed on security and privacy of IoTs
- IoT databases and its security
- Conclusion

You can't stay away! Get



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