

# SANS

THE MOST TRUSTED NAME IN INFORMATION  
AND SOFTWARE SECURITY TRAINING

*"SANS is the real deal.*

*Come with an  
open mind and  
enjoy the journey."*

-BRIAN WEBER,

UNITED WAY WORLDWIDE



GIAC Approved Training

# Network Security 2013

Las Vegas, NV | September 14-23, 2013

Hands-on immersion training programs  
taught by the world's highest-rated instructors!

## Security Essentials Bootcamp Style

**Hacker Techniques, Exploits, and Incident Handling**

**Network Penetration Testing and Ethical Hacking**

**Computer Forensic Investigations -  
Windows In-Depth**

**Web App Penetration Testing and Ethical Hacking**

**Intrusion Detection In-Depth**

**Security Leadership Essentials for Managers  
with Knowledge Compression™**

...and dozens of other courses on network and software security,  
forensics, cybersecurity and the law, management, and IT audit.

Register at

[www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)



Dear Colleague,

Please accept our invitation to attend **SANS Network Security 2013** from **September 14-23**. We will be back at **Caesars Palace in Las Vegas**, where SANS will bring you the best in network security training, certification, and up-to-the-minute research on the most important topics in the industry today. Choose from a vast array of more than 40 courses with a great selection from our IT security and security management curricula, along with four forensics choices, plus IT audit, data security law and investigations, and three secure coding offerings.

If you have attended this event in the past, then you know how valuable it can be to your career and to the safety of your company's online and data resources. If you are new to SANS Network Security 2013, we promise you a high-energy program with hands-on labs, a huge *Vendor Expo*, evening talks on the most timely security challenges, and a myriad of networking opportunities.

At SANS Network Security 2013, you'll get hands-on, immersion training from SANS' world-class instructors and learn what it takes to stop cybercrime for your organization. Our line-up includes several new courses: **SEC505: Securing Windows and Resisting Malware**; **SEC561: Hands-On Security Practitioner with NetWars**; **SEC573: Python for Penetration Testers** (sold out at SANSFIRE 2013); **FOR526: Windows Memory Forensics In-Depth**; and a new audit course scheduled **AUD444: Auditing Security and Controls of Active Directory and Windows**. If you have taken SEC401, consider **SEC501: Advanced Security Essentials – Enterprise Defender** – a follow-on course with no overlap.

**Many of the hottest courses will sell out, so register today!**

You can select a job-based full course to meet your training needs, as well as select a short skill-based course to maximize your training investment. And this year, you can start and end the week with an additional two-day course that will complement your longer course and intensify your training.

Don't forget the *NetWars Tournament* scheduled for the evenings of September 19 and 20. The NetWars competition is an interactive, Internet-based environment for computer attacks and analyzing defenses. This exciting competition features five levels, allowing participants to quickly advance to their level of expertise. Professionals from all skill levels will gain valuable information from participating. NetWars is growing in popularity at each event because it is so relevant to current security challenges. It was a big hit at SANS 2013, so don't miss the chance to secure your seat!

If you have penetration testers, forensics experts, and application and software developers on your staff, get them to Las Vegas for SANS Network Security 2013. They will bring back tools and knowledge to protect your assets!

The cybersecurity industry changes daily—attacks are making the national news and enterprises everywhere are facing increasingly complex challenges. Nothing beats a SANS live training event to bring you face-to-face with the industry leaders who are uniquely equipped to give you the best training available in the industry today. You will be able to use what you learn the day you return to work!

See you in Las Vegas!

Kind regards,

*Alan Paller*

Alan Paller  
SANS Director of Research



Alan Paller

***Here is what a few of last year's attendees had to say:***

***"Best training I have attended in 20 years in the field."***

-WING CHAN, ALLETTE, INC.

***"After I graduated from college, I thought this class was just going to be a refresher. It was that and so much more! This was my first SANS course and it won't be the last."***

-MICHAEL STANLEY, CAPITAL ONE

***"SANS is always professional, organized, flexible, friendly, and personable. I will definitely do business again with you and recommend you to peers."***

-SARAH McVEY,

LANE COUNTY GOVERNMENT

***"This was an awesome and informative experience. My organization will benefit as a result. Thanks!"***

-FAR'D THOMAS,

LOCKHEED MARTIN



# SANS IT Security Training and Your Career Roadmap

## SECURITY CURRICULUM

### Incident Handling



Additional Incident Handling Courses [www.sans.org/courses/security](http://www.sans.org/courses/security)

### Beginners

**SEC301 NOTE:**  
If you have experience in the field, please consider our more advanced course – SEC401.

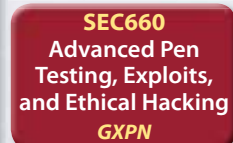
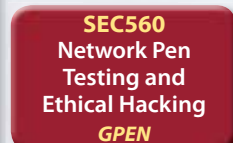


### Intrusion Analysis

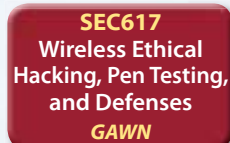


Additional Intrusion Analysis Courses [www.sans.org/courses/security](http://www.sans.org/courses/security)

### Penetration Testing



Additional Penetration Testing Courses  
<http://pen-testing.sans.org>



### System Administration



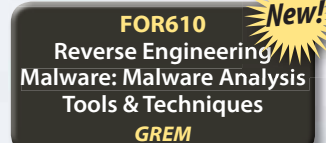
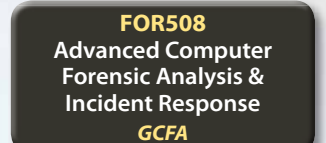
Additional System Administration Courses [www.sans.org/courses/security](http://www.sans.org/courses/security)

### Network Security



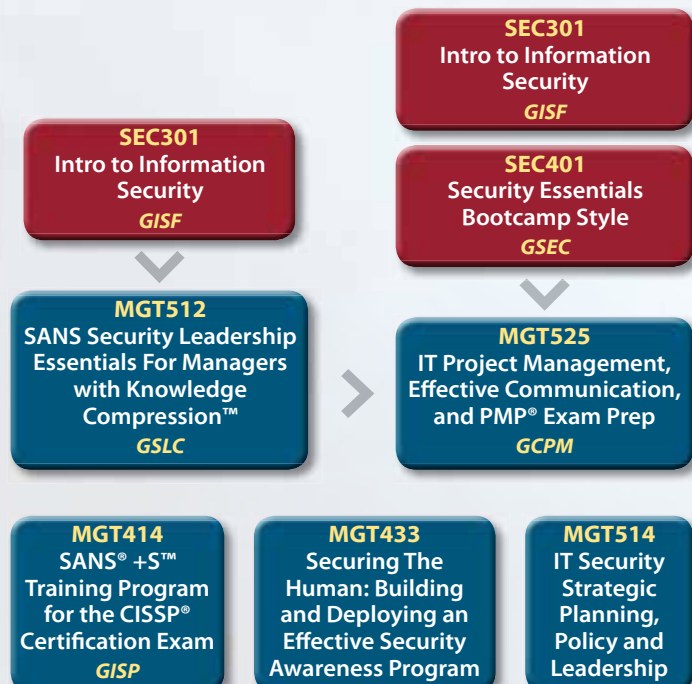
Additional Network Security Courses [www.sans.org/courses/security](http://www.sans.org/courses/security)

## FORENSICS CURRICULUM



Additional Information on Forensic Courses  
<http://computer-forensics.sans.org>

## MANAGEMENT CURRICULUM



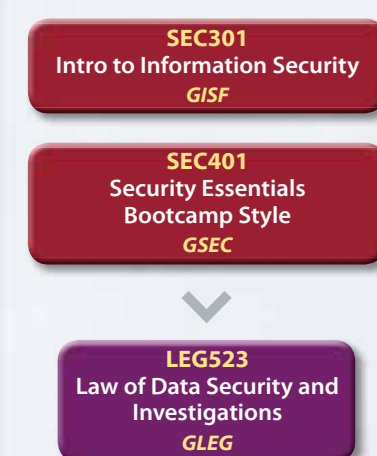
Additional Management Courses [www.sans.org/courses/management](http://www.sans.org/courses/management)

## AUDIT CURRICULUM



Additional Audit Courses <http://it-audit.sans.org>

## LEGAL CURRICULUM



GIAC certification available for courses indicated with GIAC acronyms

## SOFTWARE SECURITY CURRICULUM

### Defense



**11 Modules – 10 minutes each providing awareness-level training for people involved in application development.**

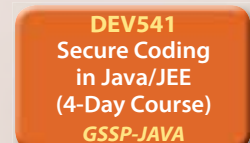
- Application Security training for development teams
- Duration = 2 hours
- Delivered = Computer-Based Training (CBT)
- Quizzes included

[www.securingtheapp.org](http://www.securingtheapp.org)

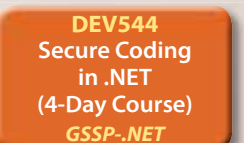


### Secure Coding

#### JAVA



#### .NET



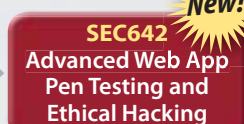
#### C & C++



#### Language Agnostic



### Attack



Additional Software Security Courses <http://software-security.sans.org>

# Courses-at-a-Glance

Please check the website for an up-to-date course list at [www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)

	SAT 9/14	SUN 9/15	MON 9/16	TUE 9/17	WED 9/18	THU 9/19	FRI 9/20	SAT 9/21	SUN 9/22	MON 9/23
<b>Assembly Language Fundamentals of Penetration Testing &amp; Reversing <i>NEW!</i></b>	<b>PAGE 59</b>									
AUD444 <b>Auditing Security and Controls of Active Directory and Windows <i>NEW!</i></b>									<b>PAGE 59</b>	
AUD507 <b>Auditing Networks, Perimeters, and Systems</b>			<b>PAGE 52</b>							
DEV522 <b>Defending Web Applications Security Essentials</b>			<b>PAGE 54</b>							
DEV541 <b>Secure Coding in Java/JEE: Developing Defensible Applications</b>			<b>PAGE 55</b>							
DEV544 <b>Secure Coding in .NET: Developing Defensible Applications</b>			<b>PAGE 55</b>							
FOR408 <b>Computer Forensic Investigations - Windows In-Depth</b>			<b>PAGE 36</b>							
FOR508 <b>Advanced Computer Forensic Analysis &amp; Incident Response <i>SIMULCAST</i></b>			<b>PAGE 38</b>							
FOR526 <b>Windows Memory Forensics In-Depth <i>NEW!</i></b>			<b>PAGE 40</b>							
FOR610 <b>Reverse-Engineering Malware: Malware Analysis Tools and Techniques <i>NEW!</i></b>			<b>PAGE 42</b>							
LEG523 <b>Law of Data Security and Investigations</b>			<b>PAGE 53</b>							
MGT305 <b>Technical Communication and Presentation Skills for Security Pros</b>		<b>P 58</b>								
MGT414 <b>SANS® +S™ Training Program for the CISSP® Cert Exam <i>SIMULCAST</i></b>			<b>PAGE 44</b>							
MGT433 <b>Securing The Human: Building and Deploying an Effective Security Awareness Program <i>SIMULCAST</i></b>	<b>PAGE 58</b>									
MGT512 <b>SANS Security Leadership Essentials for Managers with Knowledge Compression™</b>			<b>PAGE 46</b>							
MGT514 <b>IT Security Strategic Planning, Policy, and Leadership</b>			<b>PAGE 48</b>							
MGT525 <b>IT Project Management, Effective Communication, and PMP® Exam Prep</b>			<b>PAGE 50</b>							
MGT535 <b>Incident Response Team Management</b>		<b>P 59</b>								
SEC301 <b>Intro to Information Security <i>SIMULCAST</i></b>			<b>PAGE 2</b>							
SEC401 <b>Security Essentials Bootcamp Style <i>SIMULCAST</i></b>			<b>PAGE 4</b>							
SEC434 <b>Log Management In-Depth: Compliance, Security, Forensics &amp; Troubleshooting</b>	<b>PAGE 56</b>									
SEC501 <b>Advanced Security Essentials – Enterprise Defender</b>			<b>PAGE 6</b>							
SEC502 <b>Perimeter Protection In-Depth</b>			<b>PAGE 8</b>							
SEC503 <b>Intrusion Detection In-Depth <i>SIMULCAST</i></b>			<b>PAGE 10</b>							
SEC504 <b>Hacker Techniques, Exploits, and Incident Handling</b>			<b>PAGE 12</b>							
SEC505 <b>Securing Windows and Resisting Malware <i>NEW!</i></b>			<b>PAGE 14</b>							
SEC506 <b>Securing Linux/Unix</b>			<b>PAGE 16</b>							
SEC509 <b>Securing Oracle Databases</b>			<b>PAGE 17</b>							
SEC524 <b>Cloud Security Fundamentals</b>	<b>PAGE 56</b>									
SEC542 <b>Web App Penetration Testing and Ethical Hacking</b>			<b>PAGE 18</b>							
SEC546 <b>IPv6 Essentials</b>	<b>PAGE 57</b>									
SEC560 <b>Network Penetration Testing and Ethical Hacking <i>SIMULCAST</i></b>			<b>PAGE 20</b>							
SEC561 <b>Hands-On Security Practitioner with NetWars <i>NEW!</i></b>			<b>PAGE 22</b>							
SEC566 <b>Implementing &amp; Auditing the 20 Critical Security Controls <i>SIMULCAST</i></b>			<b>PAGE 24</b>							
SEC573 <b>Python for Penetration Testers <i>NEW!</i></b>			<b>PAGE 26</b>							
SEC575 <b>Mobile Device Security and Ethical Hacking</b>			<b>PAGE 28</b>							
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HOSTED <b>Social Engineering For Pentesters <i>NEW!</i></b>			<b>PAGE 60</b>							
HOSTED <b>Onapsis: Securing the SAP Platform <i>NEW!</i></b>	<b>PAGE 61</b>									
HOSTED <b>Offensive Countermeasures: The Art of Active Defenses</b>	<b>PAGE 61</b>									
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## SEC301: Intro to Information Security

This introductory certification course is the fastest way to get up to speed in information security. Written and taught by battle-scarred security veterans, this entry-level course covers a broad spectrum of security topics and is liberally sprinkled with real-life examples. A balanced mix of technical and managerial issues makes this course appealing to attendees who need to understand the salient facets of information security and the basics of risk management. Organizations often tap someone who has no information security training and say, "Congratulations, you are now a security officer." If you need to get up to speed fast, Security 301 is the course for you!

We begin by covering basic terminology and concepts, and then move to the basics of computers and networking as we discuss Internet Protocol, routing, Domain Name Service, and network devices. We cover the basics of cryptography, security management, and wireless networking, then we look at policy as a tool to effect change in your organization. On the final day of the course, we put it all together with an implementation of defense in-depth.

This course will help you develop the skills to bridge the gap that often exists between managers and system administrators, and learn to communicate effectively with personnel in all departments and at all levels within your organization.

### Who Should Attend

- Persons new to information technology who need to understand the basics of information assurance, computer networking, cryptography, and risk evaluation
- Managers and Information Security Officers who need a basic understanding of risk management and the tradeoffs between confidentiality, integrity, and availability
- Managers, administrators, and auditors who need to draft, update, implement, or enforce policy

*"If you are just starting out in information security, this course has all the basics needed to get you started."*

-SHERRIE AUD, DELTA CORPORATION

*"The information is immediately usable in the organization. Moreover, Mr. Kerby makes the presentation interesting and real-world, as well as practical and beneficial."*

-ROBERT SMITH, CMS

*"Great crash-course and immersion for security and technology! From the logistics to the IS and OS, the necessary pieces of the cyber security puzzle have come together."*

-ANSLEY LABARRE, EWA/IIT



### You Will Be Able To

- Discuss and understand risk as a product of vulnerability, threat, and impact to an organization
- Understand and apply basic principles of information assurance (e.g., least privilege, separation of risk, defense in depth, etc.)
- Explain the fundamentals of networking (link layer communications, addressing, basic routing, masquerading)
- Describe the predominant forms of malware and the various delivery mechanisms that can place organizations at risk
- Understand the capabilities and limitations of cryptography
- Evaluate policy and recommend improvements
- Identify and implement meaningful security metrics
- Identify and understand the basic attack vectors used by intruders

*"This class is great for IT professionals looking for their first step towards security awareness. I have been in IT for 17 years and I learned a lot on this first day of class."*

-PAUL BENINATI, EMC

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast. More info on page 70.



www.giac.org

### 301.1 A Framework for Information Security

Information security is based upon foundational concepts such as asset value, the CIA triad (confidentiality, integrity, and availability), principal of least privilege, access control, and separation. Day one provides a solid understanding of the terms, concepts, and tradeoffs that will enable you to work effectively within the information security landscape. If you have been in security for a while, these chapters will be a refresher, providing new perspectives on some familiar issues.

**Topics:** Basic Concepts (Value of Assets, Security Responsibilities, IA Pillars and Enablers, IA Challenges, Trust and Security); Principles (Least Privilege, Defense in Depth, Separation of Risk, Kerckhoff's Principle); Security as a Process (Analysis, Protection, Detection, Response)

### 301.2 Securing the Infrastructure

To appreciate the risks associated with being connected to the Internet one must have a basic understanding of how networks function. Day two covers the basics of networking (including a review of some sample network designs), including encapsulation, hardware and network addresses, name resolution, and address translation. We explore some typical attacks against the networking and computing infrastructure along with appropriate countermeasures.

**Topics:** Terms (Encapsulation, Ports, Protocols, Addresses, Network Reference Models - stacks); Addressing (Hardware, Network, Resolution, Transport Protocols, TCP, UDP); Other Protocols (ARP, ICMP, Routing Basics, The Local Network, Default Gateway); Network Components (Hubs, Switches, Routers, Firewalls, Component Management - SNMP); Attacks and Countermeasures (Attack Theory, Types of Attacks, Countermeasures)

### 301.3 Cryptography and Security in the Enterprise

Cryptography can be used to solve a number of security problems. Cryptography and Security in the Enterprise provides an in-depth introduction to a complex tool, (cryptography) using easy to understand examples and avoiding complicated mathematics. Attendees will gain meaningful insights into the benefits of cryptography (along with the pitfalls of a poor implementation of good tools). The day continues with an overview of the security organization in a typical company. Where does security fit in the overall organizational scheme? What is its charter? What other components of the larger organization must it interact with? We conclude the day with a whirlwind overview of wireless networking technology benefits and risks, including a roadmap for reducing risks in a wireless environment.

**Topics:** Cryptography (Cryptosystem Components, Cryptographic Services, Algorithms, Keys, Cryptographic Applications, Implementation); Security in the Enterprise (Organizational Placement, Making Security Possible, Dealing with Technology, Security Perspectives, Organizational Relationships, Building a Security Program); Wireless Network Security (Wireless Use and Deployments, Wireless Architecture and Protocols, Common Misconceptions, Top 4 Security Risks, Steps to Planning a Secure WLAN)

### 301.4 Information Security Policy

Day four will empower those with the responsibility for creating, assessing, approving, or implementing security policy with the tools and techniques to develop effective, enforceable policy. Information Security Policy demonstrates how to bring policy alive by using tools and techniques such as the formidable OODA (Orient, Observe, Decide, Act) model. We also explore risk assessment and management guidelines and sample policies, as well as examples of policy and perimeter assessments.

**Topics:** The OODA Model; Security Awareness; Risk Management Policy for Security Officers; Developing Security Policy; Assessing Security Policy; Applying What We Have Learned on the Perimeter; Perimeter Policy Assessment

### 301.5 Defense In-Depth: Lessons Learned

The goal of day five is to enable managers, administrators, and those in the middle to strike a balance between "security" and "getting the job done." We'll explore how risk management deals with more than security and how the ISO-OSI model may have an eighth layer (political) impacting communications and transmission. The day is replete with war stories from the trenches that illustrate the TSP protocol (the Tie to Sandal Protocol) used by successful security professionals worldwide.

**Topics:** The Site Security Plan; Computer Security; Application Security; Incident Handling; Making the Most of Your Opportunities with Others; Measuring Progress



**SANS Senior Instructor**  
**Fred Kerby**

Fred is an engineer, manager, and security practitioner whose experience spans several generations of networking. He was the Information Assurance Manager at the Naval Surface Warfare Center, Dahlgren Division for more than sixteen years. His team is one of the recipients of the SANS Security Technology Leadership Award as well as the Government Technology Leadership Award. Fred received the Navy Meritorious Civilian Service Award in recognition of his technical and management leadership in computer and network security. A frequent speaker at SANS, Fred's presentations reflect his opinions and are not the opinions of the Department of the Navy.

*"Mr. Kerby does a great job at simplifying the explanation of cryptography, and uses very effective real-world examples to illustrate security's position in the enterprise."*

-BRIAN PHIPPS, DENVER HEALTH



## SEC401: Security Essentials Bootcamp Style

It seems wherever you turn organizations are being broken into, and the fundamental question that everyone wants answered is: Why? Why is it that some organizations get broken into and others do not? Organizations are spending millions of dollars on security and are still compromised. The problem is they are doing good things but not the right things. Good things will lay a solid foundation, but on the right things will stop your organization from being headline news in the *Wall Street Journal*. SEC401's focus is to teach individuals the essential skills, methods, tricks, tools and techniques needed to protect and secure an organization's critical information assets and business systems. SEC401 Security Essentials teaches you the right things that need to be done to keep an organization secure. The focus is not on theory but practical hands-on tools and methods that can be directly applied when a student goes back to work in order to prevent all levels of attacks, including the APT (advanced persistent threat). In addition to hands-on skills, we will teach you how to put all of the pieces together to build a security roadmap that can scale today and into the future. When you leave our training we promise that you will have the techniques that you can implement today and tomorrow to keep your organization at the cutting edge of cyber security. Most importantly, your organization will be secure because students will have the skill sets to use the tools to implement effective security.

With the APT, organizations are going to be targeted. Whether the attacker is successful penetrating an organization's network depends on the organization's defense. While defending against attacks is an ongoing challenge with new threats emerging all of the time, including the next generation of threats, organizations need to understand what works in cyber security. What has worked and will always work is taking a risk-based approach to cyber defense. Before your organization spends a dollar of its IT budget or allocates any resources or time to anything in the name of cyber security, three questions must be answered:

1. What is the risk?
2. Is it the highest priority risk?
3. Is it the most cost-effective way of reducing the risk

Security is all about making sure you are focusing on the right areas of defense. By attending SEC401 you will learn the language and underlying theory of computer security. Since all jobs today require an understanding of security, this course will help you understand why security is important and how it applies to your job. In addition, you will gain the essential, up-to-the-minute knowledge and skills required for effective security so that you will be prepared if you are given the responsibility for securing systems and/or organizations. This course meets both of the key promises SANS makes to our students: (1) You will gain cutting-edge knowledge you can put into practice immediately upon returning to work; and, (2) You will be taught by the best security instructors in the industry.

*"Most wide-range, comprehensive security training available! Dr. Cole's engaging, energetic teaching style draws you in, his passion for security is infectious!"*

-MICHAEL LEACH, NATIONWIDE

*"I'm a newbie to security. This course presented a ton of information on this subject in a fast-paced, easy-to-understand manner."*

-MICHAEL HORKAN,  
ROCKWELL AUTOMATION

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast.  
More info on page 70.



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DoD 8570 Required  
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[www.sans.org/cyber-guardian](http://www.sans.org/cyber-guardian)



[www.sans.edu](http://www.sans.edu)

## Who Should Attend

- Security professionals who want to fill the gaps in their understanding of technical information security
- Managers who want to understand information security beyond simple terminology and concepts
- Operations personnel who do not have security as their primary job function but need an understanding of security to be effective
- IT engineers and supervisors who need to know how to build a defensible network against attacks
- Administrators responsible for building and maintaining systems that are being targeted by attackers
- Forensic, penetration testers, and auditors who need a solid foundation of security principles so they can be effective as possible at their jobs
- Anyone new to information security with some background in information systems and networking

## You Will Be Able To

- Design and build a network architecture using VLAN's, NAC and 802.1x based on APT indicator of compromise
- Run Windows command line tools to analyze the system looking for high-risk items
- Run Linux command line tools (ps, ls, netstat, etc) and basic scripting to automate the running of programs to perform continuous monitoring of various tools
- Install VMWare and create virtual machines to create a virtual lab to test and evaluate tools/ security of systems
- Create an effective policy that can be enforced within an organization and determine a checklist that can be used to validate the security, creating metrics to tie into training and awareness
- Identify visible weaknesses of a system utilizing various tools to include dumpsec and OpenVAS - and once vulnerabilities are discovered cover ways to configure the system to be more secure
- Determine overall scores for systems utilizing CIS Scoring Tools and create a system baseline across the organization
- Build a network visibility map that can be used for hardening of a network - validating the attack surface and covering ways to reduce the attack surface through hardening and patching
- Sniff open protocols like telnet and ftp and determine the content, passwords and vulnerabilities utilizing WireShark

### 401.1 Hands On: Networking Concepts

Day one teaches you how networks, routers, firewalls, and the related protocols like TCP/IP work so you'll be better prepared to determine hostile traffic and have a foundation for the succeeding days' training.

**Topics:** Network Fundamentals; IP Concepts; IP Behavior, IOS and Router Filters; Physical Security; Bootcamp

### 401.2 Hands On: Defense In-Depth

Day two covers security threats and their impact, including information warfare. It also covers sound security policies and password management tools, the six steps of incident handling, and web server security testing.

**Topics:** Defense in Depth; Security Policy and Contingency Planning; Access Control and Password Management; Incident Response; Information Warfare; Web Communications and Security; Bootcamp

### 401.3 Hands On: Internet Security Technologies

Day three gives you a roadmap that will help you understand the tools and options available for deploying systems for defense.

**Topics:** Attack Strategies and Mitigation; Vulnerability Scanning; Intrusion Detection Technologies; Intrusion Prevention Technologies; IT Risk Management; Bootcamp

### 401.4 Hands On: Secure Communications

Day four covers encryption, wireless security, and operations security.

**Topics:** Encryption 101; Encryption 102; Applying Cryptography; Wireless Network Security; VoIP; Operations Security; Bootcamp

### 401.5 Hands On: Windows Security

Day five is all about securing the current batch of Windows operating systems (Windows XP/2003/Vista/2008/Windows 7) and teaches the tools that simplify and automate the process.

**Topics:** Windows Security Infrastructure; Permissions and User Rights; Security Templates and Group Policy; Service Packs, Hotfixes, and Backups; Securing Windows Network Services; Automation and Auditing; Bootcamp

### 401.6 Hands On: Linux Security

Based on industry consensus standards, this course provides step-by-step guidance on improving the security of any Linux system. The course combines practical how-to instructions with background information for Linux beginners and security advice and best practices for administrators of all levels of expertise.

**Topics:** Linux Landscape; Linux Command Line; Linux OS Security; Linux Security Tools; Maintenance, Monitoring, and Auditing Linux



*SANS Faculty Fellow*  
**Dr. Eric Cole**

Dr. Cole is an industry-recognized security expert with over 20 years of hands-on experience. Dr. Cole currently performs leading-edge security consulting and works in research and development to advance the state of the art in information systems security. Dr. Cole has experience in information technology with a focus on perimeter defense, secure network design, vulnerability discovery, penetration testing, and intrusion detection systems. He has a master's degree in computer science from NYIT and a doctorate from Pace University with a concentration in information security. Dr. Cole is the author of several books, including *Hackers Beware*, *Hiding in Plain Site*, *Network Security Bible*, and *Insider Threat*. He is the inventor of over 20 patents and is a researcher, writer, and speaker. He is also a member of the Commission on Cyber Security for the 44th President and several executive advisory boards. Dr. Cole is founder of Secure Anchor Consulting, where he provides state-of-the-art security services and expert witness work. He also served as CTO of McAfee and Chief Scientist for Lockheed Martin. Dr. Cole is actively involved with the SANS Technology Institute (STI) and SANS, working with students, teaching, and maintaining and developing courseware. He is a SANS faculty Fellow and course author.



## SEC501: Advanced Security Essentials – Enterprise Defender

Cybersecurity continues to be a critical area for organizations and will continue to increase in importance as attacks become stealthier, have a greater financial impact on an organization, and cause reputational damage. Security Essentials lays a solid foundation for the security practitioner to engage the battle.

A key theme is that prevention is ideal, but detection is a must. We need to be able to ensure that we constantly improve our security to prevent as many attacks as possible. This prevention/protection occurs on two fronts - externally and internally. Attacks will continue to pose a threat to an organization as data become more portable and networks continue to be porous. Therefore a key focus needs to be on data protection, securing our critical information no matter whether it resides on a server, in a robust network architecture, or on a portable device.

Despite an organization's best effort at preventing attacks and protecting its critical data, some attacks will still be successful. Therefore we need to be able to detect attacks in a timely fashion. This is accomplished by understanding the traffic that is flowing on your networks and looking for indication of an attack. It also includes performing penetration testing and vulnerability analysis against an organization to identify problems and issues before a compromise occurs.

Finally, once an attack is detected we must react to it in a timely fashion and perform forensics. Understanding how the attacker broke in can be fed back into more effective and robust preventive and detective measures, completing the security lifecycle.

*"Great course. Best training I have attended. This is my first SANS course and I can't wait to attend more."*

—LEONARD CRULL, MI ANG

*"Great course! I'm disturbed/impressed at how much the instructors know. Top-notch instructors are what makes SANS!"*

—CHRIS ROBINSON, SEMPRA ENERGY

*"The information taught is valuable and applicable.*

*It does not matter what your job functions are at your company, you will definitely find value in this course."*

—LESLIE MORALES, SOUTHWEST RESEARCH INSTITUTE



### Who Should Attend

- Students who have taken Security Essentials and want a more advanced 500-level course similar to SEC401
- People who have foundational knowledge covered in SEC401, do not want to take a specialized 500-level course, and still want a broad, advanced coverage of the core areas to protect their systems
- Anyone looking for detailed technical knowledge on how to protect against, detect, and react to the new threats that will continue to cause harm to an organization

### You Will Be Able To

- Identify the threats against network infrastructures and build defensible networks that minimize the impact of attacks
- Learn the tools that can be used to analyze a network to both prevent and detect the adversary
- Decode and analyze packets using various tools to identify anomalies and improve network defenses
- Understand how the adversary compromises networks and how to respond to attacks
- Perform penetration testing against an organization to determine vulnerabilities and points of compromise
- Understand the 6 steps in the incident handling process and be able to create and run an incident handling capability
- Learn how to use various tools to identify and remediate malware across your organization
- Create a data classification program and be able to deploy data loss prevention solutions at both a host and network level

*"Very knowledgeable. Top-tier training and industry leading."*

—HERBERT MONFORD, REGIONS BANK



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### 501.1 Hands On: Defensive Network Infrastructure

Protecting a network from attack starts with designing, building, and implementing a robust network infrastructure. Many aspects to implementing a defense-in-depth network are often overlooked since companies focus on functionality. Achieving the proper balance between business drivers and core protection of information is difficult. On the first day students will learn how to design and implement a functionality-rich, secure network and how to maintain and update it as the threat landscape evolves.

**Topics:** Introducing Network Infrastructure as Targets for Attack; Implementing the Cisco Gold Standard to Improve Security; Advanced Layer 2 and 3 Controls

### 501.2 Hands On: Packet Analysis

Packet analysis and intrusion detection are at the core of timely detection. Detecting attacks is becoming more difficult as attacks become stealthier and more difficult to find. Only by understanding the core principles of traffic analysis can one become a skilled analyst and distinguish normal traffic from attack traffic. Security professionals must be able to detect new, advanced zero-day attacks before they compromise a network. Prevention, detection, and reaction must all be closely knit so that once an attack is detected, defensive measures can be adapted, proactive forensics implemented, and the organization can continue to operate.

**Topics:** Architecture Design & Preparing Filters; Detection Techniques and Measures; Advanced IP Packet Analysis; Intrusion Detection Tools

### 501.3 Hands On: Pentest

An organization must understand the changing threat landscape and compare that against its own vulnerabilities. On day three students will understand the variety of tests that can be run and how to perform penetration testing in an effective manner. Students will learn about external and internal pen testing and the methods of black, gray, and white box testing. Penetration testing is critical to identify an organization's exposure points, but students will also learn how to prioritize and fix these vulnerabilities to increase the overall security of an organization.

**Topics:** Variety of Penetration Testing Methods; Vulnerability Analysis; Key Tools and Techniques; Basic Pen Testing; Advanced Pen Testing

### 501.4 Hands On: First Responder

Any organization connected to the Internet or with employees is going to have attacks launched against it. Security professionals need to understand how to perform incident response, analyze what is occurring, and restore their organization back to a normal state as soon as possible. Day four will equip students with a proven six-step process to follow in response to an attack – prepare, identify, contain, eradicate, recover, and learn from previous incidents. Students will learn how to perform forensic investigation and find indication of an attack. This information will be fed into the incident response process and ensure the attack is prevented from occurring again in the future.

**Topics:** Incident Handling Process and Analysis; Forensics and Incident Response

### 501.5 Hands On: Malware

As security professionals continue to build more proactive security measures, attackers' methods will continue to evolve. A common way for attackers to target, control, and break into as many systems as possible is through the use of malware. Therefore it is critical that students understand what type of malware is currently available to attackers and future trends and methods of exploiting systems. With this knowledge students can then learn how to analyze, defend, and detect malware on systems and minimize the impact to the organization.

**Topics:** Malware; Microsoft Malware; External Tools and Analysis

### 501.6 Hands On: Data Loss Prevention

Cyber security is all about managing, controlling, and mitigating risk to critical assets, which in almost every organization are composed of data or information. Perimeters are still important, but we are moving away from a fortress model and moving towards a focus on data. This is based on the fact that information no longer solely resides on servers where properly configured access control lists can limit access and protect our information; it can now be copied to laptops and plugged into networks. Data must be protected no matter where it resides.

**Topics:** Risk Management; Data Classification; Digital Rights Management; Data Loss Prevention (DLP)



**SANS Certified Instructor**  
**Bryce Galbraith**

As a contributing author to the internationally bestselling book *Hacking Exposed: Network Security Secrets & Solutions*, Bryce helped bring the secret world of hacking out of the darkness and into the public eye. Bryce has held security positions at global ISPs and Fortune 500 companies, he was a member of Foundstone's renowned penetration testing team, and served as a senior instructor and co-author of Foundstone's *Ultimate Hacking: Hands-On* course series. Bryce is currently the owner of Layered Security, where he and his team provide specialized vulnerability assessment and penetration testing services for clients. He teaches several of The SANS Institute's most popular courses and develops curriculum around current topics. He has taught the art of ethical hacking and countermeasures to thousands of IT professionals from a who's who of top companies, financial institutions, and government agencies around the globe. Bryce is an active member of several security-related organizations, he speaks at numerous conferences, and holds several security certifications and blogs about security issues at <http://blog.layeredsec.com>.



## SEC502: Perimeter Protection In-Depth

There is no single fix for securing your network. That's why this course is a comprehensive analysis of a wide breadth of technologies. In fact, this is probably the most diverse course in the SANS catalog, as mastery of multiple security techniques is required to defend your network from remote attacks. You cannot just focus on a single OS or security appliance. A proper security posture must be comprised of multiple layers. This course was developed to give you the knowledge and tools necessary at every layer to ensure your network is secure.

The course material has been developed using the following guiding principles:

- Learn the process, not one specific product.
- You learn more by doing, so hands-on problem solving is key.
- Always peel back the layers and identify the root cause.

While technical knowledge is important, what really matters are the skills to properly leverage it. This is why the course is heavily focused on problem solving and root cause analysis. While these are usually considered soft skills, they are vital to being effective in the role of security architect. So along with the technical training, you'll learn risk-management capabilities and even a bit of Zen empowerment.

The course starts by looking at common problems we need to resolve. To secure your network you really need to understand the idiosyncrasies of the protocol. We'll talk about how IP works and how to spot the abnormal patterns. Then we'll learn how to control it on the wire. We focus on the underlying technology used by both good and bad products. By gaining knowledge of what goes on under the cover, you will be empowered to make good product choices for years to come.

Just because two firewalls are stateful inspection, do they really work the same on the wire? Is there really any difference between stateful inspection and network-based intrusion prevention, or is it just marketing? These are the types of questions we address in the next portion of the course.

From there, it's a hands-on tour through how to perform a proper wire-level assessment of a potential product, as well as what options and features are available. We'll learn how to deploy traffic control while avoiding some of the most common mistakes.

A properly layered defense needs to include each individual host – not just the hosts exposed to access from the Internet, but hosts that have any kind of direct or indirect Internet communication capability as well. We'll start with OS lockdown techniques and move on to third-party tools that can permit you to do anything from sandbox insecure applications to full-blown application policy enforcement.



*"The course is very valuable because it shows you the techniques and methods attackers use and how to defend against them."*

—CURTIS GREER, U.S. NAVY

*"SEC502 opened my eyes so wide it scared me!"*

—GEORGE SCARBOROUGH,  
DEFENSE LOGISTICS AGENCY

*"As an analyst, these courses are the most relevant in the industry."*

—LOUIS ROBICHAUD,  
ATLANTIC LOTTERY CORP.

### Who Should Attend

- Information security officers
- Intrusion analysts
- IT managers
- Network architects
- Network security engineers
- Network and system administrators
- Security managers
- Security analysts
- Security architects
- Security auditors

### You Will Be Able To

- Apply perimeter security solutions in order to identify and minimize weaknesses to properly protect your perimeter
- Deploy and utilize multiple firewalls to understand the strengths and weaknesses that each present
- Use built-in tools to audit, protect and identify if systems have been compromised
- Utilize tcpdump to analyze network traffic in detail to understand what packets are communicating and how to identify potential covert channels
- Understand and utilize techniques to compromise and protect against application layer attacks such as XSS, CSRF, SQL injection and more
- Utilize tools to evaluate packets and identify legitimate and illegitimate traffic
- Use tools to evaluate and identify the risks related to Cloud Computing
- Inspect the intricate complexities of IP, including identifying malicious packets
- Evaluate and secure SSL, wireless networks, VPNs, applications and more
- Implement a logging solution that properly identifies risk and is manageable



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### 502.1 Hands-On: TCP/IP for Firewalls

This first section is more than an executive overview as we dig down into the bits and bytes of the problem. What can be secured at the network level, and which protection needs to be pushed back to the hosts? What are my packet level control devices really doing on the wire, and when can't I trust them? If you want to control traffic on the wire, you have to understand the IP protocol. It is for this reason a majority of the day is spent doing packet level analysis. While many protocol analyzers will tell you what they think is happening, if you cannot read the decodes for yourself, you will have no idea when the tool is leading you astray.

**Topics:** Common Threats; Windump/Tcpdump; OSI Layer 2; OSI Layer 3; Fragmentation; OSI Layers 4 and 5

### 502.2 Hands-On: Firewalls, NIDS, and NIPS

The only way to understand if a network traffic control device is going to meet your requirements is to understand the technology underneath the hood. Do all stateful inspection firewalls handle traffic the same way? Is there really any difference between a stateful inspection firewall and a network-based intrusion prevention system (NIPS)? In today's material we will cut through the vendor marketing slicks and look at what their products are really capable of doing.

**Topics:** Static Packet Filters; Stateful Packet Filters; Stateful Inspection Filtering; Intrusion Detection and Prevention; Proxies; Cisco IOS; IP Version 6 (IPv6)

### 502.3 Hands-On: Wire Products and Assessment

In today's material we will look at how each vendor has implemented the technology. We'll also discuss how to test these products on the wire so we know exactly how they are impacting traffic. Can the product stop a covert communication channel using ICMP error packets? What about a source route attack? What about application layer attacks? These are the types of questions we'll strive to answer. The number one problem students have with managing their environment is dealing with the firewall logs. Not only will we discuss what to look for, but through practical exercises you will learn how to optimize the log review process into something that takes less time to finish than your morning coffee.

**Topics:** Traffic Control Products; Building A Firewall Rulebase; Perimeter Assessment; Web Application and Database Firewalls; Firewall Log Analysis

### 502.4 Hands-On: Host-Level Security

In the early days of the Internet it was possible to secure a network right at the perimeter. Modern-day attacks, however, are far more advanced and require a multi-layered approach to security. This does not mean the perimeter no longer serves a useful role; it's just that now it is only part of the equation. So today we focus on the security posture of our individual hosts, and look at what the OS and application vendors give us to work with and when we may need to turn to third-party tools. It is not enough to simply configure the hosts. We'll look at vulnerability scanning and audits for the hosts and applications in order to be able to validate continuous integrity. When the worst occurs, we'll talk about performing a forensic analysis as well. Finally, we will talk about security information management. The devices on your network really want to tell you what is going on, but you have to be able to sort through all of the data.

**Topics:** Securing Hosts and Services; Host-Based Intrusion Detection and Prevention; Vulnerability Assessment and Auditing; Forensics; Security Information Management

### 502.5 Hands-On: Securing the Wire

It's not enough to control traffic flow; we also need to be able to secure the data inside of the packets. We will start with the basics, authentication and encryption, and learn how these technologies are combined into the modern day VPN. We'll discuss which of the technologies have been proved to be mathematically secure and which of them is a leap of faith. Further, we will discuss how to integrate encrypted dataflow into your overall architecture design so you are not blinded to attacks through these encrypted tunnels. Then we turn our attention to securing the internal network structure. We'll cover deploying wireless access points without creating (yet another) point of management. We'll also look at network access control (NAC) and discuss what it can do today as well as its potential in the future.

**Topics:** Authentication; Encryption; VPNs, Wireless; Network Access Control

### 502.6 Hands-On: Perimeter Wrap-Up

The problems start off easy, like small organizations that need advice in order to make their environment more secure. The complexity quickly escalates to where you need to combine security, functionality, and political issues into the design. A healthy dose of risk assessment is also thrown in for good measure. You will also perform a series of labs that are hostile in nature. A majority of the previous labs were geared towards problem solving. You will be presented with a security issue and then given a hands-on process for resolving it.

**Topics:** Sizing Up A Network; Cool Tools; Cloud Security Considerations



#### SANS Certified Instructor Seth Misenar

Seth Misenar is a certified SANS instructor and also serves as lead consultant and founder of Jackson, Mississippi-based Context Security, which provides information security through leadership, independent research, and security training. Seth's background includes network and Web application penetration testing, vulnerability assessment, regulatory compliance efforts, security architecture design, and general security consulting. He has previously served as both physical and network security consultant for Fortune 100 companies as well as the HIPAA and information security officer for a state government agency. Prior to becoming a security geek, Seth received a BS in philosophy from Millsaps College, where he was twice selected for a Ford Teaching Fellowship. Also, Seth is no stranger to certifications and thus far has achieved credentials which include, but are not limited to, the following: CISSP, GPEN, GWAPT, GSEC, GCIA, GCIH, GCWN, GCFA, and MCSE. Beyond his security consulting practice, Seth is a regular instructor for SANS. He teaches numerous SANS classes, including SEC401: SANS Security Essentials Bootcamp Style, SEC504: Hacker Techniques, Exploits, and Incident Handling, and SEC542: Web App Penetration Testing and Ethical Hacking. Seth has also served as both virtual mentor and technical director for SANS OnDemand, the online course delivery arm of the SANS Institute.



## SEC503: Intrusion Detection In-Depth

If you have an inkling of awareness of security (even my elderly aunt knows about the perils of the Interweb!), you often hear the disconcerting news about another high-profile company getting compromised. The security landscape is continually changing from what was once only perimeter protection to a current exposure of always-connected and often-vulnerable. Along with this is a great demand for security savvy employees who can help to detect and prevent intrusions. That is our goal in the Intrusion Detection In-Depth course – to acquaint you with the core knowledge, tools, and techniques to prepare you to defend your networks.

This course spans a wide variety of topics from foundational material such as TCP/IP to detecting an intrusion, building in breadth and depth along the way. It's kind of like the "soup to nuts" or bits to bytes to packets to flow of traffic analysis.

Hands-on exercises supplement the coursebook material, allowing you to transfer the knowledge in your head to your keyboard using the Packetrix VMware distribution created by industry practitioner and SANS instructor Mike Poor. As the Packetrix name implies, the distribution contains many of the tricks of the trade to perform packet and traffic analysis. All exercises have two different approaches – the first is a more basic one that assists you by giving hints for answering the questions. Students who feel that they would like more guidance can use this approach. The second approach provides no hints, permitting a student who may already know the material or who has quickly mastered new material a more challenging experience. Additionally, there is an "extra credit" stumper question for each exercise intended to challenge the most advanced student.

By week's end, your head should be overflowing with newly gained knowledge and skills; and your luggage should be swollen with course book material that didn't quite get absorbed into your brain during this intense week of learning. This course will enable you to "hit the ground running" once returning to a live environment.

*"This course provides a good basis of knowledge and presents important tools which will be at the core of any intrusion analysis."*

—THOMAS KELLY, DIA

*"This course is valuable for anyone interested in IDS. Mike's knowledge and willingness to help you understand the material are unlike any other training I've been to. Great course and instructor."*

—DANNIE ARNOLD, U.S. ARMY

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast. More info on page 70.

### Who Should Attend

- Intrusion detection analysts (all levels)
- Network engineers
- System, security, and network administrators
- Hands-on security managers

### You Will Be Able To

- Identify the security solutions that are most important for protecting your perimeter
- Understand attacks that affect security for the network
- Understand the complexities of IP and how to identify malicious packets
- Understand the risks and impacts related to Cloud Computing and security solutions to manage the risks
- Understand the process for properly securing your perimeter
- Identify and understand how to protect against application and database risks
- Use tools to evaluate the packets on your network and identify legitimate and illegitimate traffic

*"Course was designed around real-world intrusions and is highly needed for network security administrators and/or analysts."*

—HECTOR ARAIZA, USAF



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### 503.1 Hands-On: Fundamentals of Traffic Analysis: Part I

Day 1 provides a refresher or introduction, depending on your background, to TCP/IP covering the essential foundations such as the TCP/IP communication model, theory of bits, bytes, binary and hexadecimal, an introduction to Wireshark, the IP layer, both IPv4 and IPv6 and packet fragmentation in both. We describe the layers and analyze traffic not just in theory and function, but from the perspective of an attacker and defender.

**Topics:** Concepts of TCP/IP; Introduction to Wireshark; Network access/link layer; IP Layer

### 503.2 Hands-On: Fundamentals of Traffic Analysis: Part II

Day 2 continues where Day 1 ended in understanding TCP/IP. Two essential tools – Wireshark and tcpdump – are explored to give you the skills to analyze your own traffic. The focus of these tools on Day 2 is filtering traffic of interest in Wireshark using display filters and in tcpdump using Berkeley Packet Filters. We proceed with our exploration of the TCP/IP layers covering TCP, UDP, and ICMP. Once again, we describe the layers and analyze traffic not just in theory and function, but from the perspective of an attacker and defender.

**Topics:** Wireshark display filters; TCP; UDP; ICMP

### 503.3 Hands-On: Application Protocols and Traffic Analysis

Day 3 culminates the examination of TCP/IP with an exploration of the application protocol layer. The concentration is on some of the most widely used, and sometimes vulnerable, crucial application protocols – HTTP, SMTP, DNS, and Microsoft communications. Our focus is on traffic analysis, a key skill in intrusion detection.

**Topics:** Advanced Wireshark; Detection methods for application protocols; Microsoft Protocols; HTTP; SMTP; DNS; Packet crafting and nmap OS identification; IDS/IPS evasion theory; Real-world traffic analysis

### 503.4 Hands-On: Intrusion Detection Snort Style

The fundamental knowledge gained from the first three days provides a fluid progression into one of the most popular days - Intrusion Detection: Snort Style. Snort is a widely deployed open source IDS/IPS that has been a standard in the industry for over a decade. Knowing how to configure, tune and use it are indispensable skills.

**Topics:** Introduction; Modes of operation; Writing Snort rules; Configuring Snort as an IDS; Miscellaneous; Snort GUIs and analysis

### 503.5 Hands-On: Network Traffic Forensics and Monitoring

On the penultimate day, you'll become familiar with other tools in the "analyst toolkit" to enhance your analysis skills and give you alternative perspectives of traffic. The open source network flow tool SiLK is introduced. It offers the capability to summarize network flows to assist in anomaly detection and retrospective analysis, especially at sites where the volume is so prohibitively large that full packet captures cannot be retained for very long, if at all.

**Topics:** Analyst toolkit; SiLK; Network Forensics; Network architecture for monitoring; Correlation of indicators

### 503.6 Hands-On: IDS Challenge

The week culminates with a fun hands-on Challenge where you find and analyze traffic to a vulnerable honeynet host using many of the same tools you mastered during the week. Students can work alone or in groups with or without workbook guidance. This is a great way to end the week since it reinforces what you've learned by challenging you to think analytically, gives you a sense of accomplishment, and strengthens your confidence to employ what you've learned in the Intrusion Detection In-Depth course in a real-world environment.



**SANS Senior Instructor  
Mike Poor**

Mike is a founder and senior security analyst for the DC firm In-Guardians, Inc. In the past he has worked for Sourcefire as a research engineer and for SANS leading its intrusion analysis team. As a consultant Mike conducts incident response, breach analysis, penetration tests, vulnerability assessments, security audits, and architecture reviews. His primary job focus, however, is in intrusion detection, response, and mitigation. Mike currently holds the GCIA certification and is an expert in network engineering and systems and network and web administration. Mike is an author of the international best selling *Snort* series of books from Syngress, a member of the HoneyNet Project, and a handler for the SANS Internet Storm Center.

*"I love the easy way/ hard way option – once I figured out how that was structured, I could use the 'hard way' to verify if I knew what I was doing or not – if not, flip back to buy a vowel. Awesome."*

—CHRISTOPHER KELSEY, ROCHE



## SEC504: Hacker Techniques, Exploits, and Incident Handling

If your organization has an Internet connection or one or two disgruntled employees (and whose doesn't!), your computer systems will get attacked. From the five, ten, or even one hundred daily probes against your Internet infrastructure to the malicious insider slowly creeping through your most vital information assets, attackers are targeting your systems with increasing viciousness and stealth.

By helping you understand attackers' tactics and strategies in detail, giving you hands-on experience in finding vulnerabilities and discovering intrusions, and equipping you with a comprehensive incident handling plan, the in-depth information in this course helps you turn the tables on computer attackers. This course addresses the latest cutting-edge insidious attack vectors and the "oldie-but-goodie" attacks that are still so prevalent, and everything in between. Instead of merely teaching a few hack attack tricks, this course includes a time-tested, step-by-step process for responding to computer incidents; a detailed description of how attackers undermine systems so you can prepare, detect, and respond to them; and a hands-on workshop for discovering holes before the bad guys do. Additionally, the course explores the legal issues associated with responding to computer attacks, including employee monitoring, working with law enforcement, and handling evidence.

This challenging course is particularly well suited to individuals who lead or are a part of an incident handling team. Furthermore, general security practitioners, system administrators, and security architects will benefit by understanding how to design, build, and operate their systems to prevent, detect, and respond to attacks.

*"The course covers almost every corner of attack and defense areas. It's a very helpful handbook for a network security analysis job. It upgrades my knowledge in IT security and keeps pace with the trend."*

-ANTHONY LIU, SCOTIA BANK

*"This class teaches you all of the hacking techniques that you need as an incident handler."*

-DEMONIQUE LEWIS, TERPSYS



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### Who Should Attend

- Incident handlers
- Penetration testers
- Ethical hackers
- Leaders of incident handling teams
- System administrators who are on the front lines defending their systems and responding to attacks
- Other security personnel who are first responders when systems come under attack

### You Will Be Able To

- Apply incident handling processes in-depth, including preparation, identification, containment, eradication, and recovery, to protect enterprise environments
- Analyze the structure of common attack techniques to be able to evaluate an attacker's spread through a system and network, anticipating and thwarting further attacker activity
- Utilize tools and evidence to determine the kind of malware used in an attack, including rootkits, backdoors, and trojan horses, choosing appropriate defenses and response tactics for each
- Use built-in command-line tools such as Windows tasklist, wmic, and reg as well as Linux netstat, ps, and lsof to detect an attacker's presence on a machine
- Analyze router and system ARP tables along with switch CAM tables to track an attacker's activity through a network and identify a suspect
- Use memory dumps and the Volatility tool to determine an attacker's activities on a machine, the malware installed, and other machines the attacker used as pivot points across the network
- Gain access of a target machine using Metasploit, and then detect the artifacts and impacts of exploitation through process, file, memory, and log analysis
- Analyze a system to see how attackers use the Netcat tool to move files, create backdoors, and build relays through a target environment
- Run the Nmap port scanner and Nessus vulnerability scanner to find openings on target systems, and apply tools such as tcpdump and netstat to detect and analyze the impacts of the scanning activity
- Apply the tcpdump sniffer to analyze network traffic generated by a covert backdoor to determine an attacker's tactics
- Employ the netstat and lsof tools to diagnose specific types of traffic-flooding denial-of-service techniques and choosing appropriate response actions based on each attacker's flood technique
- Analyze shell history files to find compromised machines, attacker-controlled accounts, sniffers, and backdoors

### 504.1 Incident Handling Step-by-Step and Computer Crime Investigation

This session describes a detailed incident handling process and applies that process to several in-the-trenches case studies. Additionally, in the evening an optional 'Intro to Linux' mini-workshop will be held. This session provides introductory Linux skills you'll need to participate in exercises throughout the rest of SEC504. If you are new to Linux, attending this evening session is crucial.

**Topics:** Preparation; Identification; Containment; Eradication; Recovery; Special Actions for Responding to Different Types of Incidents; Incident Record Keeping; Incident Follow-Up

### 504.2 Hands On: Computer and Network Hacker Exploits – Part 1 \*

It is imperative that system administrators and security professionals know how to control what outsiders can see. Students who take this class and master the material can expect to learn the skills to identify potential targets and be provided tools they need to test their systems effectively for vulnerabilities. This day covers the first two steps of many hacker attacks: reconnaissance and scanning.

**Topics:** Reconnaissance; Scanning; Intrusion Detection System Evasion; Hands-on Exercises for a List of Tools

### 504.3 Hands On: Computer and Network Hacker Exploits – Part 2 \*

Computer attackers are ripping our networks and systems apart in novel ways while constantly improving their techniques. This course covers the third step of many hacker attacks – gaining access. For each attack, the course explains vulnerability categories, how various tools exploit holes, and how to harden systems or applications against each type of attack. Students who sign an ethics and release form are issued a CD-ROM containing the attack tools examined in class.

**Topics:** Network-Level Attacks; Gathering and Parsing Packets; Operating System and Application-Level Attacks; Netcat: The Attacker's Best Friend; Hands-on Exercises with a List of Tools

### 504.4 Hands On: Computer and Network Hacker Exploits – Part 3 \*

Attackers aren't resting on their laurels, and neither can we. They are increasingly targeting our operating systems and applications with ever-more clever and vicious attacks. This session looks at increasingly popular attack avenues as well as the plague of denial of service attacks.

**Topics:** Password Cracking; Web Application Attacks; Denial of Service Attacks; Hands-on Exercises with a List of Tools

### 504.5 Hands On: Computer and Network Hacker Exploits – Part 4 \*

Once intruders have gained access into a system, they want to keep that access by preventing pesky system administrators and security personnel from detecting their presence. To defend against these attacks, you need to understand how attackers manipulate systems to discover the sometimes-subtle hints associated with system compromise. This course arms you with the understanding and tools you need to defend against attackers maintaining access and covering their tracks.

**Topics:** Maintaining Access; Covering the Courses; Five Methods for Implementing Kernel-Mode RootKits on Windows and Linux; the Rise of Combo Malware; Detecting Backdoors; Hidden File Detection; Log Editing; Covert Channels; Sample Scenarios

### 504.6 Hands On: Hacker Tools Workshop \*

In this workshop you'll apply skills gained throughout the week in penetrating various target hosts while playing Capture the Flag. Your instructor will act as your personal hacking coach, providing hints as you progress through the game and challenging you to break into the laboratory computers to help underscore the lessons learned throughout the week. For your own attacker laptop, do not have any sensitive data stored on the system. SANS is not responsible for your system if someone in the class attacks it in the workshop. Bring the right equipment and prepare it in advance to maximize what you'll learn and the fun you'll have doing it.

**Topics:** Capture the Flag Contest; Hands-on Analysis; General Exploits; Other Attack Tools and Techniques

*\*This course is available to Security 504 participants only.*



**SANS Senior Instructor  
John Strand**

John Strand is a senior instructor with the SANS Institute. Along with SEC504, he also teaches SEC560: Network Penetration Testing and Ethical Hacking; SEC580: Metasploit Kung Fu for Enterprise Pen Testing; and SEC464: Hacker Detection for System Administrators. John is the course author for SEC464 and the co-author for SEC580. When not teaching for SANS, John co-hosts PaulDotCom Security Weekly, the world's largest computer security podcast. He also is the owner of Black Hills Information Security, specializing in penetration testing and security architecture services. He has presented for the FBI, NASA, the NSA, and at DefCon. In his spare time he writes loud rock music and makes various futile attempts at fly-fishing.

*"John's experiences and teaching method reinforce concepts learned in this course. Also, on many occasions, John offered advice to students that can be directly applied to their own organization."*

-JAMES BROWNING, DEPT. OF JUSTICE



## SEC505: Securing Windows and Resisting Malware

In April of 2014, Microsoft will stop releasing any new security patches for Windows XP. Like it or not, migrating off Windows XP is no longer optional, the clock is counting down. The Securing Windows and Resisting Malware course is fully updated for Windows Server 2012, Windows 8, Server 2008-R2, and Windows 7.

This course is about the most important thing you can do to secure Windows and minimize the impact on users of these changes. You'll see the instructor demo the important steps live, and, if you bring a laptop, you can follow along. The manuals are filled with screenshots and step-by-step exercises, so you can do the steps alongside the instructor in seminar or later on your own time if you prefer.

We've all got anti-virus scanners, but what else needs to be done to combat malware and intruders using Advanced Persistent Threat (APT) techniques? Today's weapon of choice for hackers is stealthy malware with remote control channels, preferably with autonomous worm capabilities, installed through client-side exploits. While other courses focus on detection or remediation, the goal of this course is to prevent the infection in the first place (after all, first things first).

Especially in Server 2012 and beyond, PowerShell dominates Windows scripting and automation. It seems everything can be managed through PowerShell now. And if there's a needed skill that will most benefit the career of a Windows specialist, it's being able to write PowerShell scripts, because most of your competition will lack scripting skills, so it's a great way to make your resume stand out. This course devotes an entire day to PowerShell scripting, but you don't need any prior scripting experience.

This course will also prepare you for the GIAC Certified Windows Security Administrator (GCWN) certification exam to help prove your security skills and Windows expertise.



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*"You will know and be confident how to enable Windows PKI after taking this course. I had no practical experience, but plenty of theory. Jason broke down the pros and cons of the whole process. Excellent!!"*

—OTHELLO SWANSTON, DTRA-DOD

*"All Windows administrators responsible for securing IIS should attend this course."*

—BILLY TAYLOR,

NAVAL SEA LOGISTICS CENTER

*"If you think you know Windows, take this Windows security class – your review of your own skills and understanding will be challenged, for the better!!"*

—MATTHEW STOECKLE,

NEBRASKA PUBLIC POWER DISTRICT

### Who Should Attend

- Windows security engineers and system administrators
- Anyone who wants to learn PowerShell
- Anyone who wants to implement the SANS Critical Security Controls
- Those who must enforce security policies on Windows hosts
- Anyone who needs a whole drive encryption solution
- Those deploying or managing a PKI or smart cards
- IIS administrators and webmasters with servers at risk

### You Will Be Able To

- Harden the configuration settings of Internet Explorer, Google Chrome, Adobe Reader and Microsoft Office applications to better withstand client-side exploits
- Use Group Policy to harden the Windows operating system by configuring DEP, ASLR, SEHOP, EMET and AppLocker whitelisting by applying security templates and running custom PowerShell scripts
- Deploy a WSUS patch server with third-party enhancements to overcome its limitations
- Implement Server 2012 Dynamic Access Control permissions, file tagging and auditing for Data Loss Prevention (DLP)
- Use Active Directory permissions and Group Policy to safely delegate administrative authority in a large enterprise to better cope with token abuse, pass-the-hash, service/task account hijacking, and other advanced attacks
- Install and manage a full Windows PKI, including smart cards, Group Policy auto-enrollment, and detection of spoofed root CA certificates
- Configure BitLocker drive encryption with a TPM chip using graphical and PowerShell tools
- Harden SSL, RDP, DNSSEC and other dangerous protocols using Windows Firewall and IPSec rules managed through Group Policy and PowerShell scripts
- Install the Windows RADIUS server (NPS) for PEAP-TLS authentication of 802.11 wireless clients, and hands-free client configuration through Group Policy
- Harden an IIS web and FTP server against determined attackers, including WebDAV, FTP over SSL, HTTP-layer firewalling, and smart card authentication
- Learn how to automate security tasks on local and remote systems with the PowerShell scripting language and remoting framework

### 505.1 Hands On: Operating System and Applications Hardening

This course is about strategies for resisting malware infection. Malware is used by hackers and thieves in Advanced Persistent Threat (APT) scenarios to maintain stealthy remote control of your networks. By hardening the Windows operating system and the applications typically exploited by attackers, we hope to block the initial compromise which grants our adversaries a foothold inside the LAN. The trick, of course, is to do it in a cost-effective and scalable way with the least impact on users.

**Topics:** Choosing Malware-Resistant Software; Patch Management; Security Templates; Group Policy; Hardening Internet Explorer, Adobe Reader, Google Chrome; AppLocker Whitelisting

### 505.2 Hands On: Dynamic Access Control and Restricting Admin Compromise

Dynamic Access Control (DAC) is designed for managing and auditing the access to millions of files across many file servers. Claims associated with users and computers can be combined with traditional group memberships to define who has access to what. Files can be classified according to your own custom rules. DAC can be part of your Data Loss Prevention (DLP) infrastructure. At the same time, hackers and malware often rely upon excessive administrative powers in the hands of users and even IT personnel. We will also see how to manage these powers and delegate authority safely.

**Topics:** File Classification Infrastructure; User and Device Claims; Kerberos Armoring; Conditional Expressions; Central Access Policy for Auditing; Active Directory Permissions; User Account Control

### 505.3 Hands On: Windows PKI, BitLocker, and Secure Boot

Windows provides a comprehensive Public Key Infrastructure (PKI) for managing certificates and making their use as transparent to users as possible. Windows PKI uses Active Directory to store certificates, Group Policy for hands-free deployment, and a special PKI database for private key archival and recovery. Everything you need for a full PKI, such as for smart cards, SSL/TLS, wireless WPA and VPNs, is built into Windows for free. BitLocker provides sector-level whole drive encryption and, with an optional TPM chip, can verify boot-up integrity too. BitLocker key recovery can be managed through Group Policy, which is important for preventing data loss and allowing forensics analysis. Secure Boot in Windows 8 and later protects against bootkits on UEFI systems.

**Topics:** PKI Benefits; PKI Installation and Management; Installing Certificates Through Group Policy; Certificate Revocation; How To Issue Smart Cards; Managing BitLocker; BitLocker Key Recovery; UEFI Secure Boot

### 505.4 Hands On: Dangerous Protocols, IPsec, Windows Firewall, and Wireless

This course will show you how to use DNSSEC, SMBv3 encryption, RDP certificates and IPsec throughout the enterprise using Group Policy. IPsec provides authentication, integrity and encryption of packets in a way that is transparent to users and applications. IPsec is tightly integrated into the Windows Firewall, and this host-based firewall can be managed through Group Policy, NETSH.EXE or PowerShell. In the afternoon, we will then see how to use RADIUS for securing access to WPA 802.11 wireless networks using PEAP and digital certificates from your PKI. Wireless security best practices will also be covered.

**Topics:** DNSSEC, TLS/SSL, RDP, SMBv3, and IPsec Hardening; Group Policy Management of Windows Firewall; Windows RADIUS Service; 802.1X and WPA2; Wireless Best Practices

### 505.5 Hands On: Server Hardening and IIS

After attending this course you will know how to shrink the attack surface of Windows Server and harden IIS against determined attackers. The techniques discussed will apply to most types of servers, but the focus is on IIS web servers. We will also talk about essential IIS concepts like SSL/TLS encryption, authentication, worker processes, application pools, WebDAV, request filtering with URL Rewrite, and FTP Over SSL.

**Topics:** Server hardening; Authentication; SSL/TLS; Minimal NTFS and IIS Permissions; IIS Modules; Web Gardens and Application Pools; Leveraging IPsec in the DMZ; FTP Over SSL; Limiting Damage From Compromise

### 505.6 Hands On: Windows PowerShell Scripting

PowerShell is Microsoft's replacement for the old CMD.EXE shell. PowerShell is available as a free download and is built into Server 2008, Windows 7 and later by default. During the course we will walk through all the essentials of PowerShell together. The course presumes nothing, you don't have to have any prior scripting experience to attend. And, most importantly, be prepared to have fun!

**Topics:** Running PowerShell Cmdlets and Scripts; Writing Your Own Functions and Scripts; Flow Control; .NET Object Piping; Windows Management Instrumentation (WMI); Managing Events Logs and Active Directory; Walk Through Lots of Example Scripts Together



**SANS Faculty Fellow**  
**Jason Fossen**

Jason Fossen is a principal security consultant at Enclave Consulting LLC, a published author, and a frequent public speaker on Microsoft security issues. He is the sole author of the SANS' week-long Securing Windows course (SEC505), maintains the Windows day of Security Essentials (SEC401.5), and has been involved in numerous other SANS' projects since 1998. He graduated from the University of Virginia, received his master's degree from the University of Texas at Austin, and holds a number of professional certifications. He currently lives in Dallas, Texas. Jason blogs about Windows Security Issues on the SANS Windows Security Blog at <http://blogs.sans.org/windows-security>

## SEC506: Securing Linux/Unix

*Experience in-depth coverage of Linux and Unix security issues.*

Examine how to mitigate or eliminate general problems that apply to all Unix-like operating systems, including vulnerabilities in the password authentication system, file system, virtual memory system, and applications that commonly run on Linux and Unix. This course provides specific configuration guidance and practical, real-world examples, tips, and tricks.

Throughout this course you will become skilled at utilizing freely available tools to handle security issues, including SSH, AIDE, sudo, Isof, and many others. SANS' practical approach with hands-on exercises every day ensures that you can start using these tools as soon as you return to work. We will also put these tools to work in a special section that covers simple forensic techniques for investigating compromised systems.

### Topics

- Memory Attacks, Buffer Overflows
- File System Attacks, Race Conditions
- Trojan Horse Programs and Rootkits
- Monitoring and Alerting Tools
- Unix Logging and Kernel-Level Auditing
- Building a centralized logging infrastructure
- Network Security Tools
- SSH for Secure Administration
- Server lockdown for Linux and Unix
- Controlling root access with sudo
- SELinux and chroot() for application security
- DNSSEC deployment and automation
- mod\_security and Web Application Firewalls
- Secure Configuration of BIND, Sendmail, Apache
- Forensic Investigation

*"This is a very comprehensive course with many helpful tips and scripts. It increased my knowledge of Windows Security an order of magnitude."*

-DAN GRUBBS, U.S. NAVY



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### Who Should Attend

- Security professionals looking to learn the basics of securing Unix operating systems
- Experienced administrators looking for in-depth descriptions of attacks on Unix systems and how they can be prevented
- Administrators needing information on how to secure common Internet applications on the Unix platform
- Auditors, incident responders, and InfoSec analysts who need greater visibility into Linux and Unix security tools, procedures, and best practices

### You Will Be Able To

- Significantly reduce the number of vulnerabilities in the average Linux/Unix system by disabling unnecessary services
- Protect your systems from buffer overflows, denial-of-service, and physical access attacks by leveraging OS configuration settings
- Configure IP Tables and iptfilter host-based firewalls to block attacks from outside
- Deploy SSH to protect administrative sessions, and leverage SSH functionality to securely automate routine administrative tasks
- Use sudo to control and monitor administrative access
- Create a centralized logging infrastructure with Syslog-NG, and deploy log monitoring tools to scan for significant events
- Use SELinux to effectively isolate compromised applications from harming other system services
- Securely configure common Internet-facing applications such as Apache, BIND, and Sendmail
- Investigate compromised Unix/Linux systems with the Sleuthkit, Isof, and other Open Source tools
- Understand attacker rootkits and how to detect them with AIDE and rkhunter/chkrootkit

*"It sparked my interest to get a deeper understanding of how to secure my systems at work and at home. Hal's experience as a forensics examiner is of great interest and a definite plus. Great experience."*

-TIM HORNE, HONEYWELL AEROSPACE





## SEC509: Securing Oracle Databases

Experts agree that Oracle is one of the most complex software packages available today. Unfortunately, complexity often introduces an increased risk for vulnerabilities. These vulnerabilities are being increasingly targeted by attackers. It is not uncommon for the SANS Internet Storm Center to see hundreds of thousands of hack attempts against Oracle databases each month.

SANS recognizes the need for comprehensive Oracle security training to help organizations protect their most critical information resources. In this course, the student is led through the process of auditing and securing Oracle by defining the risks to data, using techniques for detecting unauthorized access attempts, using Oracle access controls and user management functions, and developing reliable processes to secure the Oracle database, as well as applications.

Throughout the course the student will be exposed to the database as seen through the eyes of an attacker, including public and unreleased techniques that are used to compromise the integrity of the database or escalate a user's privileges. In this fashion, the student gains a better understanding of how an attacker sees a database as a target and how we can configure the database to be resistant to known and unknown attacks.

This course has been updated for versions of Oracle up to and including 11g on Unix and Windows operating systems.

### Author Statement

Database compromises are a significant risk faced by organizations today. Data compromises seem to be constantly occurring, and many of the huge breaches that we know about today resulted because database security was improperly addressed. Databases are key targets because they store one of our most valuable resources - our data. The data needs to be protected. Oracle is one of the most exciting and challenging databases that exists. When it comes to securing an Oracle database, there are many challenges that Administrators and security professionals will face. This course is designed to be a fully comprehensive and intense introduction to planning, auditing, and securing an Oracle database. The course doesn't just mention the vulnerabilities, but it explains why the issues may exist and how an attacker could leverage them. Multiple hands-on exercises reinforce the content we learn in class. This aids the student in thinking like an attacker, which needs to be done to protect the databases. Students are often amazed at the many different ways an attacker might compromise an Oracle database! Ultimately, the goal is to teach how to protect one of the most important organizational assets - the data. This course is an exciting and interesting journey in protecting this critical organizational asset! -Tanya Baccam



### Who Should Attend

- Persons new to Information Technology (IT) who need to understand the basics of information assurance, computer networking, cryptography, and risk evaluation
- Managers and Information Security Officers who need a basic understanding of risk management and the tradeoffs between confidentiality, integrity, and availability
- Managers, administrators, and auditors who need to draft, update, implement, or enforce policy

### Topics

- Securing Oracle
- Foundations
- Oracle attack vectors and security features
- Host operating system security
- Identifying passwords in the environment
- Authentication methods
- Default users and password audits
- Schema and application owners
- Implementing password management
- Access and output
- Roles and users
- Configuration
- PUBLIC privileges, profiles, packages, and objects
- Oracle auditing - myths and facts
- Reviewing the audit trail
- Forensics
- Fine Grained Audi
- Securing Exposed Services
- Auditing the Oracle listener
- Network Access to Oracle
- Encryption
- Restricting developer and access tools
- Oracle programming issues
- Web application vulnerabilities
- Controlling applications and tools
- Controlling application internals
- Oracle security future

## SEC542: Web App Penetration Testing and Ethical Hacking

### Assess Your Web Apps in Depth

Web applications are a major point of vulnerability in organizations today. Web app holes have resulted in the theft of millions of credit cards, major financial and reputational damage for hundreds of enterprises, and even the compromise of thousands of browsing machines that visited websites altered by attackers. In this intermediate to advanced level class, you'll learn the art of exploiting web applications so you can find flaws in your enterprise's web apps before the bad guys do. Through detailed, hands-on exercises and training from a seasoned professional, you will be taught the four-step process for Web application penetration testing. You will inject SQL into back-end databases, learning how attackers exfiltrate sensitive data. You will utilize cross-site scripting attacks to dominate a target infrastructure in our unique hands-on laboratory environment. And you will explore various other web app vulnerabilities in depth with tried-and-true techniques for finding them using a structured testing regimen. You will learn the tools and methods of the attacker, so that you can be a powerful defender.

Throughout the class, you will learn the context behind the attacks so that you intuitively understand the real-life applications of our exploitation. In the end, you will be able to assess your own organization's web applications to find some of the most common and damaging Web application vulnerabilities today.

By knowing your enemy, you can defeat your enemy. General security practitioners, as well as website designers, architects, and developers, will benefit from learning the practical art of web application penetration testing in this class.

***"SEC542 is a step-by-step introduction to testing and penetrating web applications, a must for anyone who builds, maintains, or audits web systems."***

***-BRAD MILHORN, II2P LLC***



***"Without a doubt, this was the best class for my career."***

***-DON BROWN, LOCKHEED MARTIN***

***"Fun while you learn! Just don't tell your manager. Every class gives you invaluable information from real world testing you cannot find in a book."***

***-DAVID FAVA, THE BOEING COMPANY***

### Who Should Attend

- General security practitioners
- Penetration testers
- Ethical hackers
- Web application vulnerability
- Website designers and architects
- Developers

### You Will Be Able To

- Apply a detailed, four-step methodology to your web application penetration tests, including Recon, Mapping, Discovery, and Exploitation
- Analyze the results from automated web testing tools to remove false positives and validate findings
- Use python to create testing and exploitation scripts during a penetration test
- Create configurations and test payloads within Burp Intruder to perform SQL injection, XSS, and other web attacks
- Use FuzzDB to generate attack traffic to find flaws such as Command Injection and File Include issues
- Assess the logic and transaction flaw within a target application to find logic flaws and business vulnerabilities
- Use the rerelease of Durzosploit to obfuscate XSS payloads to bypass WAFs and application filtering
- Analyze traffic between the client and the server application using tools such as Ratproxy and Zed Attack Proxy to find security issues within the client-side application code
- Use BeEF to hook victim browsers, attack the client software and network, and evaluate the potential impact XSS flaws have within an application
- Perform a complete web penetration test during the Capture the Flag exercise to pull all of the techniques and tools together into a comprehensive test



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### 542.1 Hands On: The Attacker's View of the Web \*

We begin by examining web technology – protocols, languages, clients, and server architectures – from the attacker's perspective. Then we cover the four steps of web application pen tests: reconnaissance, mapping, discovery, and exploitation.

**Topics:** Overview of the Web from a Penetration Tester's Perspective; Exploring the Various Servers and Clients; Discussion of the Various Web Architectures; Discover How Session State Works; Discussion of the Different Types of Vulnerabilities; Define a Web Application Test Scope and Process; Define Types of Penetration Testing

### 542.2 Hands On: Reconnaissance and Mapping \*

Reconnaissance includes gathering publicly-available information regarding the target application and organization, identifying machines that support our target application, and building a profile of each server. Then we will build a map of the application by identifying the components, analyzing the relationship between them, and determining how they work together.

**Topics:** Discover the Infrastructure Within the Application; Identify the Machines and Operating Systems; SSL Configurations and Weaknesses; Explore Virtual Hosting and its Impact on Testing; Learn Methods to Identify Load Balancers; Software Configuration Discovery; Explore External Information Sources; Google Hacking; Learn Tools to Spider a Website; Scripting to Automate Web Requests and Spidering; Application Flow Charting; Relationship Analysis Within an Application; JavaScript for the Attacker

### 542.3 Hands On: Server-Side Discovery \*

We will continue with the discovery phase, exploring both manual and automated methods of discovering vulnerabilities within the applications as well as exploring the interactions between the various vulnerabilities and the different user interfaces that web apps expose to clients.

**Topics:** Learn Methods to Discover Various Vulnerabilities; Explore Differences Between Different Data Back-ends; Explore Fuzzing and Various Fuzzing Tools; Discuss the Different Interfaces Websites Contain; Understand Methods for Attacking Web Services

### 542.4 Hands On: Client-Side Discovery \*

Learning how to discover vulnerabilities within client-side code, such as Java applets and Flash objects, includes use of tools to decompile the objects and applets. We will have a detailed discussion of how AJAX and web service technology enlarges the attack surface that pen testers leverage.

**Topics:** Learn Methods to Discover Various Vulnerabilities; Learn Methods to Decompile Client-side Code; Explore Malicious Applets and Objects; Discover Vulnerabilities in Web Application Through Their Client Components; Understand Methods for Attacking Web Services; Understand Methods for Testing Web 2.0 and AJAX-based Sites; Learn How AJAX and Web Services Change Penetration Tests; Learn the Attacker's Perspective on Python and PHP

### 542.5 Hands On: Exploitation \*

Launching exploits against real-world applications includes exploring how they can help in the testing process, gaining access to browser history, port scanning internal networks, and searching for other vulnerable web applications through zombie browsers.

**Topics:** Explore Methods to Zombify Browsers; Discuss Using Zombies to Port Scan or Attack Internal Networks; Explore Attack Frameworks; Walk Through an Entire Attack Scenario; Exploit the Various Vulnerabilities Discovered; Leverage the Attacks to Gain Access to the System; Learn How to Pivot our Attacks Through a Web Application; Understand Methods of Interacting with a Server Through SQL Injection; Exploit Applications to Steal Cookies; Execute Commands Through Web Application Vulnerabilities

### 542.6 Hands On: Capture the Flag \*

The goal of this event is for students to use the techniques, tools, and methodology learned in class against a realistic intranet application. Students will be able to use a virtual machine with the SamuraiWTF web pen testing environment in class and can apply that experience in their workplace.

**Topics:** Capture the Flag

*\*This course is available to Security 542 participants only.*



**SANS Senior Instructor  
Kevin Johnson**

Kevin Johnson is a security consultant and founder of Secure Ideas. Kevin came to security from a development and system administration background. He has many years of experience performing security services for Fortune 100 companies, and in his spare time he contributes to a large number of open-source security projects. He is the founder of many different projects and has worked on others. He founded BASE, which is a web front-end for Snort analysis. He also founded and continues to lead the SamuraiWTF live DVD. This is a live environment focused on web penetration testing. He also founded Yokoso! and Laudanum, which are focused on exploit delivery. Kevin is a senior instructor for SANS and the author of Security 542: Web Application Penetration Testing and Ethical Hacking. He also presents at industry events, including DEFCON and ShmooCon, and for various organizations, like Infragard, ISACA, ISSA, and the University of Florida.



## SEC560: Network Penetration Testing and Ethical Hacking

As cyber attacks increase, so does the demand for information security professionals who possess true network penetration testing and ethical hacking skills. There are several ethical hacking courses that claim to teach these skills, but few actually do. SANS SEC560: Network Penetration Testing and Ethical Hacking truly prepares you to conduct successful penetration testing and ethical hacking projects. The course starts with proper planning, scoping and recon, and then dives deep into scanning, target exploitation, password attacks, and wireless and web apps with detailed hands-on exercises and practical tips for doing the job safely and effectively. You will finish up with an intensive, hands-on Capture the Flag exercise in which you'll conduct a penetration test against a sample target organization, demonstrating the knowledge you mastered in this course.

### Equipping Security Organizations with Advanced Penetration Testing and Ethical Hacking Know-How

Security vulnerabilities, such as weak configurations, unpatched systems, and botched architectures, continue to plague organizations. Enterprises need people who can find these flaws in a professional manner to help eradicate them from our infrastructures. Lots of people claim to have penetration testing, ethical hacking, and security assessment skills, but precious few can apply these skills in a methodical regimen of professional testing to help make an organization more secure. This class covers the ingredients for successful network penetration testing to help attendees improve their enterprise's security stance.

We address detailed pre-test planning, including setting up an effective penetration testing infrastructure and establishing ground rules with the target organization to avoid surprises and misunderstanding. Then, we discuss a time-tested methodology for penetration and ethical hacking across the network, evaluating the security of network services and the operating systems behind them.

Attendees will learn how to perform detailed reconnaissance, learning about a target's infrastructure by mining blogs, search engines, and social networking sites. We'll then turn our attention to scanning, experimenting with numerous tools in hands-on exercises. Our exploitation phase will include the use of exploitation frameworks, stand-alone exploits, and other valuable tactics, all with hands-on exercises in our lab environment. The class also discusses how to prepare a final report, tailored to maximize the value of the test from both a management and technical perspective. The final portion of the class includes a comprehensive hands-on exercise, conducting a penetration test against a hypothetical target organization, following all of the steps.

The course also describes the limitations of penetration testing techniques and other practices that can be used to augment penetration testing to find vulnerabilities in architecture, policies, and processes. We also address how penetration testing should be integrated as a piece of a comprehensive enterprise information security program.

*"I think if you genuinely want to learn how exploitation techniques work and how to properly think like a hacker, it would be silly not to attend."*

-MARK HAMILTON, McAfee

*"The skills taught and demonstrated in this class are perfect for new pen testers and veterans alike."*

-ROY LUONGO, DEPT OF DEFENSE

### Who Should Attend

- Penetration testers
- Ethical hackers
- Auditors who need to build deeper technical skills
- Security personnel whose job involves assessing target networks and systems to find security vulnerabilities

### You Will Be Able To

- Develop tailored scoping and rules of engagement for penetration testing projects to ensure the work is focused, well defined, and conducted in a safe manner
- Conduct detailed reconnaissance using document metadata, search engines, and other publicly available information sources to build a technical and organizational understanding of the target environment
- Utilize a scanning tool such as Nmap to conduct comprehensive network sweeps, port scans, OS fingerprinting, and version scanning to develop a map of target environments
- Choose and properly execute Nmap Scripting Engine scripts to extract detailed information from target systems
- Configure and launch a vulnerability scanner such as Nessus so that it discovers vulnerabilities through both authenticated and unauthenticated scans in a safe manner, and customize the output from such tools to represent the business risk to the organization
- Analyze the output of scanning tools to manually verify findings and perform false positive reduction using connection-making tools such as Netcat and packet crafting tools such as Scapy
- Utilize the Windows and Linux command lines to plunder target systems for vital information that can further the overall penetration test progress, establish pivots for deeper compromise, and help determine business risks
- Configure an exploitation tool such as Metasploit to scan, exploit, and then pivot through a target environment
- Conduct comprehensive password attacks against an environment, including automated password guessing (while avoiding account lockout), traditional password cracking, rainbow table password cracking, and pass-the-hash attacks
- Utilize wireless attacks tools for Wifi networks to discover access points and clients (actively and passively), crack WEP/WPA/WPA2 keys, and exploit client machines included within a project's scope
- Launch web application vulnerability scanners such as ZAP and then manually exploit Cross-Site Request Forgery, Cross-Site Scripting, Command Injection, and SQL Injection vulnerabilities to determine the business risk faced by an organization

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast. More info on page 70.



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## Course Day Descriptions

### 560.1 Hands On: Planning, Scoping, and Recon \*

This course provides extensive details of penetration testing preparation and methodology, which are immensely useful in meeting the Payment Card Industry (PCI) Data Security Standard (DSS) Requirement 11.3 on penetration testing. We cover building a penetration testing and ethical hacking infrastructure that includes the appropriate hardware, software, network infrastructure, and test tools arsenal, with specific low-cost recommendations. This portion of the course also describes how to plan the specifics of a test, carefully scoping the project and defining the rules of engagement.

**Topics:** The Mindset of the Professional Pen Tester; Legal Issues; Reporting; Types of Penetration Tests and Ethical Hacking Projects; Detailed Recon; Mining Search Engine Results with Aura/Wikto/EvilAPI

### 560.2 Hands On: Scanning \*

This component of the course focuses on the vital task of scanning a target environment, creating a comprehensive inventory of machines, and then evaluating those systems to find potential vulnerabilities. We'll look at some of the most useful scanning tools freely available today, experimenting with them in our hands-on lab. Because vulnerability-scanning tools inevitably give us false positives, we'll also look at techniques for false-positive reduction with hands-on exercises.

**Topics:** Overall Scanning Tips; tcpdump for the Pen Tester; Protocol Anomalies; The Nmap Scripting Engine; Version Scanning with Nmap and Amap; False Positive Reduction

### 560.3 Hands On: Exploitation and Post Exploitation \*

In this section we look at the many kinds of exploits that a penetration tester or ethical hacker can use to compromise a target machine. We'll analyze in detail the differences between server-side, client-side, and local privilege escalation exploits, exploring some of the most useful recent exploits in each category. We'll see how these exploits are packaged in frameworks like Metasploit and its mighty Meterpreter. We'll also look at post-exploit analysis of machines and pivoting to find new targets.

**Topics:** Comprehensive Metasploit Framework Coverage with Exploits/Stagers/Stages; Bypassing the Shell vs. Terminal Dilemma; Installing VNC/RDP/SSH with Only Shell Access; Running Windows Commands Remotely with sc and wmic; Building Port Scanners and Password Guessers at the Command Line

### 560.4 Hands On: Password Attacks \*

This component of the course turns our attention to password attacks, analyzing password guessing, password cracking, and pass-the-hash techniques in depth. Because passwords remain the dominant authentication scheme of most enterprises, professional penetration testers and ethical hackers need to understand how to find password weaknesses in a target environment. We'll go over numerous tips based on real-world experience to help penetration testers and ethical hackers maximize the effectiveness of their password attacks. We'll cover one of the best automated password-guessing tools available today, THC Hydra, and run it against target machines to guess Windows SMB and Linux SSH passwords. We'll then zoom in on the password representation formats for most major operating systems, discussing various cracking tools in-depth.

**Topics:** The primacy of passwords; Password attack tips; Account lockout and strategies; Password Guessing with THC-Hydra; Password representation formats in depth; John the Ripper features for penetration testers; Cain: The pen tester's dream tool; Rainbow table attacks in depth; Pass-the-hash attacks against Windows: Using hashes without even cracking a password

### 560.5 Hands On: Wireless and Web Apps \*

This section describes methodologies for finding common wireless weaknesses, including misconfigured access points, application of weak security protocols, and the improper configuration of stronger security technologies. The second half focuses on web application pen testing and looking for the flaws that impact commercial and homegrown web apps. Attendees will work hands on with tools that can find cross-site scripting (XSS), cross-site request forgery (XSRF), command injection, and SQL injection flaws, experimenting with each in several exercises.

**Topics:** Wireless Attacks; Discovering Access Points (Wire-Side and Wireless-Side); Wireless Crypto Flaws; Client-Side Wireless Attacks; Cross-Site Scripting; Cross-Site Request Forgery; SQL Injection; Leveraging SQL Injection to Perform Command Injection

### 560.6 Hands On: Penetration Testing Workshop and Capture the Flag Event \*

This lively session represents the culmination of the network penetration testing and ethical hacking course, where attendees apply the skills mastered in the other sessions in a hands-on workshop. The rest of the course covers the overall process for successful testing with a series of hands-on exercises individually illustrating each point. But in this final workshop, all of the exercises converge in an overall network penetration-testing workout, where attendees will function as part of a pen test team.

**Topics:** Applying Penetration Testing and Ethical Hacking Practices End-to-end; Scanning; Exploitation; Pivoting; Analyzing Results

*\*This course is available to Security 560 participants only.*



**SANS Faculty Fellow**  
**Ed Skoudis**

Ed Skoudis is the founder of Counter Hack Challenges, an innovative organization that designs, builds, and operates popular infosec challenges and simulations including NetWars, Cyber Quests, and Cyber Foundations. Ed's expertise includes hacker attacks and defenses, the information security industry, and computer privacy issues, with over fifteen years of experience in information security. Ed authored and regularly teaches the SANS courses on network penetration testing (Security 560) and incident response (Security 504), helping over three thousand information security professionals each year improve their skills and abilities to defend their networks. He has performed numerous security assessments; conducted exhaustive anti-virus, anti-spyware, Virtual Machine, and IPS research; and responded to computer attacks for clients in financial, high technology, healthcare, and other industries. Ed conducted a demonstration of hacker techniques against financial institutions for the United States Senate and is a frequent speaker on issues associated with hacker tools and defenses. He has published numerous articles on these topics as well as the Prentice Hall best sellers *Counter Hack Reloaded* and *Malware: Fighting Malicious Code*. Ed was also awarded 2004-2012 Microsoft MVP awards for Windows Server Security and is an alumnus of the Honeynet Project. Previously, Ed served as a security consultant with InGuardians, International Network Services (INS), Global Integrity, Predictive Systems, SAIC, and Bell Communications Research (Bellcore). Ed also blogs about command line tips.

**NEW!**

## SECURITY 561

Six-Day Program | Mon, Sept 16 - Sat, Sept 21 | 9:00am - 5:00pm  
Laptop Required | 36 CPE/CMU Credits | Instructor: Joshua Wright

### SEC561: Hands-On Security Practitioner with NetWars

Today, many information security practitioners are expected to leverage cross-disciplinary skills in complex areas. Analysts are no longer able to specialize in just a single skill area, such as vulnerability assessment, network penetration testing, or web app assessment. To face today's threats, organizations need employees who add value to the team across varying focus areas, contributing to both operations and security teams.

Few practitioners have the time to build broad skills across many different security areas. The best way to pick up new skills quickly is to practice them in hands-on, real-world scenarios designed to challenge and guide a participant. The Hands-On Security Practitioner course creates a learning environment where participants can quickly build and reinforce skills in multiple focus areas, including:

- Network security assessment, identifying architecture weaknesses in network deployments
- Host-based security assessment, protecting against privilege escalation attacks
- Web application penetration testing, exploiting common flaws in complex systems
- Advanced system attacks, leveraging pivoting and tunneling techniques to identify exposure areas deep within an organization

The Hands-On Security Practitioner course departs from most lecture-based training models to help practitioners quickly build skills in many different information security focus areas. Using the NetWars challenge platform, participants engage in practical and real-world defensive and offensive Capture the Flag exercises that are fun and exciting. By maximizing hands-on time in exercises, participants build valuable skills that are directly applicable as soon as they return to the office.

Participants who complete the Hands-On Security Practitioner course work on realistic scenarios to quickly build skills that are difficult to achieve independently. After completing the course, participants will be able to apply these skills to various areas within their own organizations, significantly increasing their ability to take on cross-disciplinary projects and tasks.

**NETWARS**



#### Who Should Attend

- Security professionals who want to expand their hands-on technical skills in new analysis areas such as packet analysis, digital forensics, vulnerability assessment, system hardening, and penetration testing
- Systems and network administrators who want to gain hands-on experience in information security skills to become better administrators
- Incident response analysts who want to better understand system attack and defense techniques
- Forensic analysts who need to improve their analysis through experience with real-world attacks
- Penetration testers seeking to gain practical hands-on experience for use in their own assessments

#### You Will Be Able To

- Use network scanning and vulnerability assessment tools to effectively map out networks and prioritize discovered vulnerabilities for effective remediation
- Use password analysis tools to identify weak authentication controls leading to unauthorized server access
- Evaluate web applications for common developer flaws leading to significant data loss conditions
- Manipulate common network protocols to maliciously reconfigure internal network traffic patterns
- Identify weaknesses in modern anti-virus signature and heuristic analysis systems
- Inspect the configuration deficiencies and information disclosure threats present on Windows and Linux servers
- Bypass authentication systems for common web application implementations
- Exploit deficiencies in common cryptographic systems
- Bypass monitoring systems by leveraging IPv6 scanning and exploitation tools
- Harvest sensitive mobile device data from iOS and Android targets



### 561.1 Hands On: Security Platform Analysis \*

The first day of the course prepares students for real-world security challenges by giving them hands-on practice with essential Linux and Windows server and host management tools. First, students will leverage built-in and custom Linux tools to evaluate the security of host systems and servers, inspecting and extracting content from rich data sources such as image headers, browser cache content, and system logging resources. Next, students will turn their focus to performing similar analysis against remote Windows servers using built-in Windows system management tools to identify misconfigured services, scrutinize historical registry entries for USB devices, evaluate the impact of malware attacks, and analyze packet capture data. By completing these tasks, students build their skills in managing systems, applicable to post-compromise system host analysis, or defensive tasks such as defending targeted systems from persistent attack threats. By adding new tools and techniques to their arsenal, students are better prepared to complete the analysis of complex systems with greater accuracy in less time.

**Topics:** Linux Host and Server Analysis; Windows Host and Server Analysis

### 561.2 Hands On: Enterprise Security Assessment \*

In this section of the class, students investigate the critical tasks for a high-quality penetration test. We'll look at the safest, most efficient ways to map a network and discover target systems and services. Once the systems are discovered, we look for vulnerabilities and reduce false positives with manual vulnerability verification. We'll also look at exploitation techniques including the use of the Metasploit Framework to exploit these vulnerabilities, accurately describing risk and further reducing false positives. Of course, exploits are not the only way to access systems, so we also leverage password-related attacks including guessing and cracking techniques to extend our reach for a more effective and valuable penetration test.

**Topics:** Network Mapping and Discovery; Enterprise Vulnerability Assessment; Network Penetration Testing; Password and Authentication Exploitation

### 561.3 Hands On: Web Application Assessment \*

This section of the course will look at the variety of flaws present in web applications and how each of them is exploited. Students will solve challenges presented to them by exploiting web applications hands-on with the tools used by professional web application penetration testers every day. The websites students attack mirror real-world vulnerabilities including Cross-Site Scripting (XSS), SQL Injection, Command Injection, Directory Traversal, Session Manipulation and more. Students will need to exploit the present flaws and answer questions based on the level of compromise they are able to achieve.

**Topics:** Recon and Mapping; Server-side Web Application Attacks; Client-side Web Application Attacks; Web Application Vulnerability Exploitation

### 561.4 Hands On: Mobile Device and Application Analysis \*

With the accelerated growth of mobile device use in enterprise networks, organizations find an increasing need to identify expertise in the security assessment and penetration testing of mobile devices and the supporting infrastructure. In this component of the course, we examine the practical vulnerabilities introduced by mobile devices and applications, and how they relate to the security of the enterprise. Students will look at the common vulnerabilities and attack opportunities against Android and Apple iOS devices, examining data remnants from lost or stolen mobile devices, the exposure introduced by common weak application developer practices, and the threat introduced by popular cloud-based mobile applications found in many networks today.

**Topics:** Mobile Device Assessment; Mobile Device Data Harvesting; Mobile Application Analysis

### 561.5 Hands On: Advanced Penetration Testing \*

This portion of the class is designed to teach the advanced skills required in an effective penetration test to extend our reach and move through the target network. This extended reach will provide a broader and more in-depth look at the security of the enterprise. We'll utilize techniques to pivot through compromised systems using various tunneling/pivoting techniques, bypass anti-virus, and built-in commands to extend our influence over the target environment and find issues that lesser testers may have missed. We'll also look at some of the common mistakes surrounding poorly or incorrectly implemented cryptography and ways to take advantage of those weaknesses to access systems and data that are improperly secured.

**Topics:** Anti-Virus Evasion Techniques; Advanced Network Pivoting Techniques; Exploiting Network Infrastructure Components; Exploiting Cryptographic Weaknesses

### 561.6 Hands On: Capture the Flag Challenge \*

This lively session represents the culmination of the course, where attendees will apply the skills they have mastered throughout all the other sessions in a hands-on workshop. Attendees will participate in a larger version of the exercises present in the class to independently reinforce skills learned throughout the course. Attendees will apply their newly developed skills to scan for flaws, use exploits, unravel technical challenges, and dodge firewalls, all while guided by the challenges presented to you by the NetWars Scoring Server. By practicing the skills in a combination workshop where multiple focus areas are combined, participants will have the opportunity to explore, exploit, pillage, and continue to reinforce skills against a realistic target environment.

**Topics:** VoIP supporting infrastructure; VoIP Environment Awareness

*\*This course is available to Security 561 participants only.*



**SANS Senior Instructor  
Joshua Wright**

Joshua Wright is an independent information security analyst and senior instructor with the SANS Institute. A widely recognized expert in the wireless security field, Josh has worked with private and government organizations to evaluate the threat surrounding wireless technology and evolving threats. As an open-source enthusiast, Josh has developed a variety of tools that can be leveraged for penetration testing and security analysis. Josh publishes his tools, papers, and techniques for effective security analysis on his website at [www.willhackforsushi.com](http://www.willhackforsushi.com).

## SEC566: Implementing and Auditing the Twenty Critical Security Controls – In-Depth

**SPECIAL NOTE:** This in-depth course has been updated to incorporate new attack vectors published in version 4.2 of the Critical Controls released November 5, 2012. [www.sans.org/critical-security-controls](http://www.sans.org/critical-security-controls)

Cybersecurity attacks are increasing and evolving so rapidly that it is more difficult than ever to prevent and defend against them. Does your organization have an effective method in place to detect, thwart, and monitor external and internal threats to prevent security breaches?

As threats evolve, an organization's security should too. To enable your organization to stay on top of this ever-changing threat scenario, SANS has designed a comprehensive course on how to implement the Twenty Critical Security Controls, a prioritized, risk-based approach to security. Designed by private and public sector experts from around the world, the Controls are the best way to block known attacks and mitigate damage from successful attacks. They have been adopted by the U.S. Department of Homeland Security, state governments, universities, and numerous private firms.

The Controls are specific guidelines that CISOs, CIOs, IGs, systems administrators, and information security personnel can use to manage and measure the effectiveness of their defenses. They are designed to complement existing standards, frameworks, and compliance schemes by prioritizing the most critical threat and highest payoff defenses, while providing a common baseline for action against risks that we all face.

The Controls are an effective security framework because they are based on actual attacks launched regularly against networks. Priority is given to Controls that (1) mitigate known attacks (2) address a wide variety of attacks, and (3) identify and stop attackers early in the compromise cycle.

The British government's Center for the Protection of National Infrastructure describes the Controls as the "baseline of high-priority information security measures and controls that can be applied across an organisation in order to improve its cyber defence."

### The Course: Implementing and Auditing the Twenty Critical Security Controls

SANS' in-depth, hands-on training will teach you how to master the specific techniques and tools needed to implement and audit the Critical Controls. It will help security practitioners understand not only how to stop a threat, but why the threat exists, and how to ensure that security measures deployed today will be effective against the next generation of threats. Specifically, by the end of the course students will know how to:

- Create a strategy to successfully defend their data
- Implement controls to prevent data from being compromised
- Audit systems to ensure compliance with Critical Control standards.

The course shows security professionals how to implement the controls in an existing network through cost-effective automation. For auditors, CIOs, and risk officers, the course is the best way to understand how you will measure whether the Controls are effectively implemented.

*"This class is extremely valuable for any organization wanting to know where they stand on security."*

—DAVID OBRIEN, COSTCO

*"James does an outstanding job of providing an overview of each control as well as offering his perspective and experience which adds a lot of value."*

—DANNY TOMLINSON, KAPSTONE PAPER

### Who Should Attend

- Information assurance auditors
- System implementers or administrators
- Network security engineers
- IT administrators
- Department of Defense personnel or contractors
- Federal agencies or clients
- Private sector organizations looking to improve information assurance processes and secure their systems
- Security vendors and consulting groups looking to stay current with frameworks for information assurance
- Alumni of SEC/AUD440, SEC401, SEC501, SANS Audit classes, and MGT512

### You Will Be Able To

- Apply a security framework based on actual threats that is measurable, scalable, and reliable in stopping known attacks and protecting organizations' important information and systems
- Understand the importance of each control, how it is compromised if ignored, and explain the defensive goals that result in quick wins and increased visibility of network and systems
- Identify and utilize tools that implement controls through automation
- Learn how to create a scoring tool for measuring the effectiveness of each control
- Employ specific metrics to establish a baseline and measure the effectiveness of security controls
- Understand how critical controls map to standards such as NIST 800-53, ISO 27002, the Australian Top 35, and more
- Audit each of the critical security controls, with specific, proven templates, checklists, and scripts provided to facilitate the audit process

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast. More info on page 70.



### 566.1 Hands On: Introduction and Overview of the 20 Critical Controls \*

Day 1 will cover an introduction and overview of the 20 Critical Controls, laying the foundation for the rest of the class. For each control the following information will be covered and we will follow the same outline for each control:

- Overview of the Control
- Configuration & Hygiene
- Steps for Root Cause Analysis of Failures
- How it is Compromised
- Advanced
- Audit/Evaluation Methodologies
- Defensive Goals
- Overview of Evaluating the Control
- Evaluation Tools
- Quick Wins
- Core Evaluation Test(s)
- Exercise to Illustrate Implementation or Steps for Auditing a Control
- Visibility & Attribution
- Testing/Reporting Metrics

In addition, Critical Controls 1 and 2 will be covered in depth.

**Topics:** Critical Control 1 - Inventory of Authorized and Unauthorized Devices  
Critical Control 2 - Inventory of Authorized and Unauthorized Software

### 566.2 Hands On: Critical Controls 3,4,5, and 6 \*

**Topics:** Critical Control 3: Secure Configurations for Hardware and Software on Laptops, Workstations, and Servers  
Critical Control 4: Continuous Vulnerability Assessment and Remediation  
Critical Control 5: Malware Defenses  
Critical Control 6: Application Software Security

### 566.3 Hands On: Critical Controls 7, 8, 9, 10, and 11 \*

**Topics:** Critical Control 7: Wireless Device Control  
Critical Control 8: Data Recovery Capability (validated manually)  
Critical Control 9: Security Skills Assessment and Appropriate Training to Fill Gaps (validated manually)  
Critical Control 10: Secure Configurations for Network Devices such as Firewalls, Routers, and Switches  
Critical Control 11: Limitation and Control of Network Ports, Protocols, and Services

### 566.4 Hands On: Critical Controls 12, 13, 14, and 15 \*

**Topics:** Critical Control 12: Controlled Use of Administrative Privileges  
Critical Control 13: Boundary Defense  
Critical Control 14: Maintenance, Monitoring, and Analysis of Audit Logs  
Critical Control 15: Controlled Access Based On Need to Know

### 566.5 Hands On: Critical Controls 16, 17, 18, 19, and 20 \*

**Topics:** Critical Control 16: Account Monitoring and Control  
Critical Control 17: Data Loss Prevention  
Critical Control 18: Incident Response Capability (validated manually)  
Critical Control 19: Secure Network Engineering (validated manually)  
Critical Control 20: Penetration Tests and Red Team Exercises (validated manually)

*\*This course is available to Security 566 participants only.*



**SANS Senior Instructor  
James Tarala**

James Tarala is a principal consultant with Enclave Security and is based out of Venice, Florida. He is a regular speaker and senior instructor with the SANS Institute as well as a courseware author and editor for many SANS auditing and security courses. As a consultant, he has spent the past few years architecting large enterprise IT security and infrastructure architectures, specifically working with many Microsoft-based directory services, e-mail, terminal services, and wireless technologies. He has also spent a large amount of time consulting with organizations to assist them in their security management, operational practices, and regulatory compliance issues, and he often performs independent security audits and assists internal audit groups to develop their internal audit programs. James completed his undergraduate studies at Philadelphia Biblical University and his graduate work at the University of Maryland. He holds numerous professional certifications.



## SEC573: Python for Penetration Testers

Your target has been well hardened. So far, your every attempt to compromise their network has failed. But, you did find evidence of a vulnerability, a lucky break in their defensive posture. Sadly, all of your tools have failed to successfully exploit it. Your employers demand results. What do you do when “off-the-shelf” tools fall short? You write your own tool.

The best penetration testers can customize existing open source tools or develop their own tools. The ability to read, write, and customize software is what distinguishes the good penetration tester from the great penetration tester. This course is designed to give you the skills you need for tweaking, customizing, or outright developing your own tools to put you on the path of becoming a great penetration tester. Again and again, organizations serious about security emphasize their need for skilled tool builders. There is a huge demand for people who can understand a problem and then rapidly develop prototype code to attack or defend against it. Join us and learn Python in-depth and fully weaponized.

Unfortunately, many penetration testers do not have these skills today. The time and effort required to develop programming skills may seem overwhelming. But it is not beyond your reach. This course is designed to meet you at your current skill level, appealing to a wide variety of backgrounds ranging from people without a drop of coding experience all the way up to skilled Python developers looking to increase their expertise and map their capabilities to penetration testing. Because you can't become a world-class tool builder by merely listening to lectures, the course is chock full of hours of hands-on labs every day that will teach you the skills required to develop serious Python programs and how to apply those skills in penetration testing engagements.

The course begins with an introduction to SANS pyWars, a 4-day Capture the Flag competition that runs parallel to the course material. It will challenge your existing programming skills and help you develop new skills at your own individualized pace. This allows experienced programmers to quickly progress to more advanced concepts and while novice programmers spend time building a strong foundation. This individualized approach allows everyone to hone their current skills making them the most lethal weapon they can be.

After introducing pyWars the course covers the essential skills required to get the most out of the Python language. The essentials workshop labs will teach the concepts and techniques required to develop your own tools to students who are new to software development. The essentials workshop will also teach shortcuts that will make experienced developers even more deadly. Then we turn to applying those skills in today's real-world penetration testing scenarios. You will develop a port scanning, antivirus evading, client infecting backdoor for placement on target systems. You will develop a SQL injection tool to extract data from websites that fail with off-the-shelf tools. You will develop a multi-threaded password guessing tool and a packet assembling network reconnaissance tool. The course concludes with a one day Capture the Flag event that will test both your ability to apply your new tools and coding skills in a penetration testing challenge.

*When you are ready to fully weaponize your penetration testing skillset...*

*When you are ready to go from being a good penetration tester to a great penetration tester...*

*When you are ready to begin using your own tools to automate your penetration testing skills...*

*Join us for Python for Penetration testers. In-depth Python...*

*Fully weaponized.*

### Who Should Attend

- Security professionals who want to learn how to develop Python applications
- Penetration testers who want to move from being a consumer of security tools to the creator of security tools
- Technologists who need custom tools to test their infrastructure and desire to create those tools themselves

### You Will Be Able To

- Write a backdoor that uses Exception Handling, Sockets, Process execution, and encryption to provide you with your initial foothold in a target environment. The backdoor will include features such as a port scanner to find an open outbound port, the ability to evade antivirus software and network monitoring and the ability to embed payload from tools such as Metasploit.
- Write a SQL Injection tool that uses standard Python libraries to interact with target websites. You will be able to use different SQL attack techniques for extracting data from a vulnerable target system.
- Develop a tool to launch password guessing attacks. While developing this tool you will also make your code run faster by using multi-threading. You will handle modern authentication system by handling cookies and bypassing CAPTCHAs. You will know how to enhance your program with local application proxies and how to create and use target customized password files.
- Write a network reconnaissance tool that uses SCAPY, cStringsIO and PIL to reassemble TCP packet streams, extract data payloads such as images, display images, extract Metadata such as GPS coordinates and link those images with GPS coordinates to Google maps.

### You Will Receive

- A virtual machine with sample code and working examples
- A copy of Violent Python

### 573.1 Hands On: Essentials Workshop – Part 1 \*

**Topics:** Variables; Math Operators; Strings; Functions; Modules; Compound Statements; Introspection

### 573.2 Hands On: Essentials Workshop – Part 2 \*

**Topics:** Lists; Loops; Tuples; Dictionaries; The Python Debugger; System Arguments & OptParser; File Operations

### 573.3 Hands On: Pentesting Applications – Part 1 \*

**Topics:**

- Developing Python Backdoors:
  - Network Sockets
  - Process Execution
  - Antivirus and IDS Evasion
  - Exception Handling
  - Metasploit Integration
- Developing SQL Injection Attack Tools:
  - Introduction to SQL
  - Developing Web Clients
  - Mutexes and Semaphores
  - Blind SQL Injection Techniques
  - Multi-Threaded Applications
  - Message Queues and Thread Communications

### 573.4 Hands On: Pentesting Applications – Part 2 \*

**Topics:**

- Developing Password Attack Tools:
  - HTTP Form Password Guessing
  - HTTP Proxies/HTTP Cookies
  - Advanced Web Client Techniques
  - Session Hijacking
- Developing Network Reconnaissance Tools:
  - TCP Packet Reassembly With Scapy
  - Extracting Images from TCP Streams
  - Analyzing Image Metadata

### 573.5 Hands On: Capture the Flag \*

Test your skills. Prove your might.

*\*This course is available to Security 573 participants only.*



**SANS Certified Instructor**  
**Mark Baggett**

Mark Baggett has been in the Information Security Industry for 18 years. He has served in a variety of roles from software developer to the Chief Information Security Officer for an international news and media company. Mark is very active in the information security community. He has won various awards including winning the Ethical Hacker Christmas Hacking Challenge two years in a row and being an ISE nominee for Security Executive of the Year. Mark is the founding president of The Greater Augusta ISSA (Information Systems Security Association) chapter that has been extremely successful in bringing networking and educational opportunities to Augusta Information Technology workers. As part of the Pauldotcom Team, Mark generates blog content for the “pauldotcom.com” podcast which is the most listened to information security podcast, on the Internet. In January 2011, Mark assumed a new role as the Technical Advisor to the DoD for SANS where he will assist various government branches in the development of “Cyber Warrior” training programs.

## SEC575: Mobile Device Security and Ethical Hacking

**Now updated to cover Apple iOS 6, BlackBerry 10, Android Jelly Bean, and Windows Phone 8**

Mobile phones and tablets have become essential to enterprise and government networks, from small organizations to Fortune 500 companies and large-scale agencies. Often, mobile phone deployments grow organically, adopted by multitudes of end-users for convenient email access as well as by managers and executives who need access to sensitive organizational resources from their favored personal mobile devices. In other cases, mobile phones and tablets have become critical systems for a wide variety of production applications from enterprise resource planning to project management. With increased reliance on these devices, organizations are quickly recognizing that mobile phones and tablets need greater security implementations than a simple screen protector and clever password.

### *The security risks of mobile phone and tablet device use in the workplace*

Whether the device is an Apple iPhone or iPad, a Windows Phone, an Android or BlackBerry phone or tablet, the ubiquitous mobile device has become a hugely attractive and vulnerable target for nefarious attackers. The use of mobile devices introduces a vast array of new risks to organizations, including:

- distributed sensitive data storage and access mechanisms
- lack of consistent patch management and firmware updates
- the high probability of device loss or theft, and more.

Mobile code and apps are also introducing new avenues for malware and data leakage, exposing critical enterprise secrets, intellectual property, and personally identifiable information assets to attackers. To further complicate matters, today there simply are not enough people with the security skills needed to manage mobile phone and tablet deployments.

### *From mobile device security policy development, to design and deployment, and more*

This course was designed to help organizations struggling with mobile device security by equipping personnel with the skills needed to design, deploy, operate, and assess a well-managed secure mobile environment. From practical policy development to network architecture design and deployment, and mobile code analysis to penetration testing and ethical hacking, this course will help you build the critical skills necessary to support the secure deployment and use of mobile phones and tablets in your organization.

You will gain hands-on experience in designing a secure mobile phone network for local and from remote users and learn how to make critical decisions to support devices effectively and securely. You will also be able to analyze and evaluate mobile software threats, and learn how attackers exploit mobile phone weaknesses so you can test the security of your own deployment. With these skills, you will be a valued mobile device security analyst, fully able to guide your organization through the challenges of securely deploying mobile devices.



*"Wow! This course is everything you need to know about mobile device deployment, risks and more. Don't deploy your mobile devices without taking this course first."*

—BRYAN SIMON, INTEGRIS CREDIT UNION

### Who Should Attend

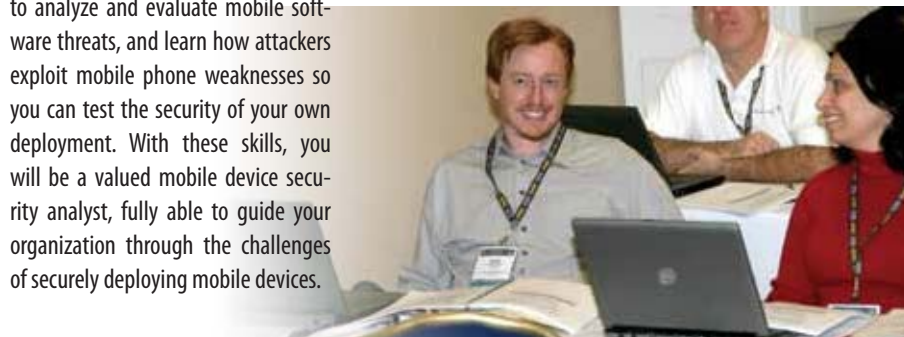
- Security personnel whose job involves assessing, deploying, or securing mobile phones and tablets
- Network and system administrators supporting mobile phones and tablets
- Penetration testers
- Ethical hackers
- Auditors who need to build deeper technical skills

### You Will Be Able To

- Develop effective policies to control employee-owned (Bring Your Own Device, BYOD) and enterprise-owned mobile devices including the enforcement of effective passcode policies and permitted application
- Utilize jailbreak tools for Apple iOS and Android systems such as redsn0w and Absinthe
- Conduct an analysis of iOS and Android filesystem data using SqliteSpy, Plist Editor, and AXMLPrinter to plunder compromised devices and extract sensitive mobile device use information such as the SMS history, browser history, GPS history, and user dictionary keywords
- Analyze Apple iOS and Android applications with reverse engineering tools including class-dump, JD-GUI, dex-translator, and apktool to identify malware and information leakage threats in mobile applications
- Conduct an automated security assessment of mobile applications using iAuditor, Cycrypt, MobileSubstrate, TaintDroid, and DroidBox to identify security flaws in mobile applications
- Use wireless network analysis tools to identify and exploit wireless networks, crack WEP and WPA/WPA2 access points, bypass enterprise wireless network authentication requirements, and harvest user credentials
- Intercept and manipulate mobile device network activity using Burp to manipulate the actions taken by a user in an application and to deliver mobile device exploits to vulnerable devices

*"With the mad rush towards mobile device adoption at the point of sale and industry regulations and laws struggling to keep up, thank goodness SANS helps companies maintain secure operations."*

—DEAN ALTMAN, DISCOUNT TIRE





### 575.1 Hands On: Mobile Device Threats, Policies, and Security Models \*

The first part of the course looks at the significant threats affecting mobile phone deployment and how organizations are being attacked through these systems. As a critical component of a secure deployment, we guide you through the process of defining mobile phone and tablet policies with sample policy language and recommendations for various vertical industries, taking into consideration the legal obligations of enterprise organizations. We'll also look at the architecture and technology behind mobile device infrastructure systems for Apple, Android, BlackBerry, and Windows devices, as well as the platform-specific security controls available including device encryption, remote data wipe, application sandboxing, and more.

**Topics:** Mobile Phone and Tablet Problems and Opportunities; Mobile Devices and Infrastructure; Mobile Phone and Tablet Security Models; Legal Aspects of Mobile; Mobile Device Policy Considerations and Development

### 575.2 Hands On: Mobile Device Architecture Security & Management \*

With an understanding of the threats, architectural components and desired security methods, we can design and implement device and infrastructure systems to defend these threats. In this part of the course, we'll examine the design and deployment of network and system infrastructure to support a mobile phone deployment including the selection and deployment of Mobile Device Management (MDM) systems.

**Topics:** Wireless Network Infrastructure; Remote Access Systems; Certificate Deployment Systems; Mobile Device Management (MDM) System Architecture; Mobile Device Management (MDM) Selection

### 575.3 Hands On: Mobile Code and Application Analysis \*

With the solid analysis skills taught in this section of the course, we can evaluate apps to determine the type of access and information disclosure threats that they represent. Security professionals can use these skills not only to determine which outside applications the organization should allow, but also to evaluate the security of any apps developed by the organization itself for its employees or customers. In this process, we'll use jailbreaking and other techniques to evaluate the data stored on mobile phones.

**Topics:** Unlocking, Rooting, and Jailbreaking Mobile Devices; Mobile Phone Data Storage and Filesystem Architecture; Filesystem Application Modeling; Network Activity Monitoring; Mobile Code and Application Analysis; Approving or Disapproving Applications in Your Organization

### 575.4 Hands On: Ethical Hacking Mobile Networks \*

Through ethical hacking and penetration testing, we examine the mobile devices and infrastructure from the perspective of an attacker, identifying and exploiting flaws that could allow unauthorized access to data or supporting networks. By identifying and understanding the implications of these flaws, we can evaluate the mobile phone deployment risk to the organization with practical, useful risk metrics.

**Topics:** Fingerprinting Mobile Devices; WiFi Attacks; Bluetooth Attacks; Network Exploits

### 575.5 Hands On: Ethical Hacking Mobile Phones, Tablets, and Applications \*

Continuing our look at ethical hacking and penetration testing, we turn our focus to exploiting weaknesses on individual mobile devices including iPhones, iPads, Android phones, Windows Phones and BlackBerry phones and tablets. We'll also examine platform-specific application weaknesses and look at the growing use of web framework attacks.

**Topics:** Mobile Device Exploits; Web Framework Attacks; Application Attacks; Cloud/Remote Data Accessibility Attacks

### 575.6 Hands On: Secure Mobile Phone Capture the Flag \*

On the last day of class, we apply the skills, concepts, and technology covered in the course for a comprehensive Capture the Flag event. In this day-long, in-depth final hands-on exercise, you will:

- Have the option to participate in multiple organizational roles related to mobile device security,
- Design a secure infrastructure for the deployment of mobile phones,
- Monitor network activity to identify attacks against mobile devices,
- Extract sensitive data from a compromised iPad, and
- Attack a variety of mobile phones and related network infrastructure components.

In the exercise, you will use the skills built throughout the course to evaluate real-world systems and defend against attackers, simulating the realistic environment you'll face when you get back to the office. You will leave the course armed with the knowledge and skills you'll need to securely integrate and deploy mobile devices in your organization.

*\*This course is available to Security 575 participants only.*



### SANS Certified Instructor Christopher Crowley

Christopher Crowley has 15 years of industry experience managing and securing networks. He currently works as an independent consultant in the Washington, DC area. His work experience includes penetration testing, computer network defense, incident response, and forensic analysis. Mr. Crowley is the course author for SANS Management 535 - Incident Response Team Management and holds the GSEC, GCIA, GCIH (gold), GCFA, GPEN, GREM, and CISSP certifications. His teaching experience includes SEC401, SEC503, SEC504, SEC560, SEC575, SEC580, and MGT535; Apache web server administration and configuration; and shell programming. He was awarded the SANS 2009 Local Mentor of the year award, which is given to SANS Mentors who excel in leading SANS Mentor Training classes in their local communities.

## SEC579: Virtualization and Private Cloud Security

One of today's most rapidly evolving and widely deployed technologies is server virtualization. Many organizations are already realizing the cost savings from implementing virtualized servers, and systems administrators love the ease of deployment and management for virtualized systems. There are even security benefits of virtualization – easier business continuity and disaster recovery, single points of control over multiple systems, role-based access, and additional auditing and logging capabilities for large infrastructures.

### Server virtualization vulnerabilities

With these benefits comes a dark side, however. Virtualization technology is the focus of many new potential threats and exploits and presents new vulnerabilities that must be managed. In addition, there are a vast number of configuration options that security and system administrators need to understand, with an added layer of complexity that has to be managed by operations teams. Virtualization technologies also connect to network infrastructure and storage networks and require careful planning with regard to access controls, user permissions, and traditional security controls.

In addition, many organizations are evolving virtualized infrastructure into private clouds – internal shared services running on virtualized infrastructure. Security architecture, policies, and processes will need to adapt to work within a cloud infrastructure, and there are many changes that security and operations teams will need to accommodate to ensure assets are protected.

### Virtualization and private cloud security architecture and design

The class starts out with two days of architecture and security design for both virtualization and private cloud infrastructure. The entire gamut of components will be covered ranging from hypervisor platforms to virtual networking, storage security to locking down the individual virtual machine files. We'll describe how to secure the management interfaces and servers, delve into Virtual Desktop Infrastructure (VDI), and go in-depth on what to consider when building a private cloud from existing virtualization architecture. Finally, we'll look at integrating virtual firewalls and intrusion detection systems into the new architecture for access control and network monitoring.

### Virtualization infrastructure, policy, and auditing

The next two days we'll go into detail on offense and defense – how can we assess virtualized environment using scanning and pen testing tools and techniques, and how do things change when we move to a cloud model? We'll cover a variety of scanners and vulnerability management tools and practices, and then take a hard look at virtualization vulnerabilities, exploits, and toolkits for pen testing that we can put to use in class.

Once we cover the offense, we'll take the opposite approach and go into detail on performing intrusion detection and logging within the virtual environment, as well as covering anti-malware advances and changes within virtual infrastructure. We'll wrap up the session with coverage of incident handling within virtual and cloud environments, as well as adapting forensics processes and tools to ensure we can maintain chain-of-custody and perform detailed analysis of virtualized assets.

### Vulnerability management, pen testing, and intrusion detection

During day 5, we will help you adapt your existing security policies and practices to the new virtualized or cloud-based infrastructure. We'll show you how to design a foundational risk assessment program and then build on this with policies, governance, and compliance considerations within your environment. We'll cover auditing and assessment of your virtualized assets, with a session on scripting that will help you put this into practice right away. Then we'll go in-depth into data security within a private cloud environment, discussing encryption and data lifecycle management techniques that will help you keep up with data that are much more mobile than ever before. Identity and Access Management (IAM) within a virtualized/cloud environment will be touched on, and we'll wrap up with a thorough session on disaster recovery and business continuity planning that leverages and benefits from virtualization and cloud-based technology.

On day 6, we'll cover the top virtualization configuration and hardening guides from DISA, CIS, Microsoft, and VMware, and talk about the most important and critical things to take away from these to implement. We culminate with data security and encryption, and Identity and Access Management (IAM) and Disaster Recovery (DR) and Business Continuity Planning (BCP).

### Who Should Attend

- Security personnel who are tasked with securing virtualization and private cloud infrastructure
- Network and systems administrators who need to understand how to architect, secure, and maintain virtualization and cloud technologies
- Technical auditors and consultants who need to gain a deeper understanding of VMware virtualization from a security and compliance perspective

### You Will Be Able To

- Lock down and maintain a secure configuration for all components of a virtualization environment
- Design a secure virtual network architecture
- Evaluate virtual firewalls, intrusion detection and prevention systems, and other security infrastructure
- Evaluate security for private cloud environments
- Perform vulnerability assessments and pen tests in virtual and private cloud environments, and acquire forensic evidence
- Perform audits and risk assessments within a virtual or private cloud environment

***"Valuable hands-on experience securing and managing a virtual environment to prepare IT professionals for next-generation threats and complexity in the data centers."***

—CHARLES BENAGH, NORTHROP GRUMMAN

***"I plan to (eventually) send everyone in my Net Ops and Cyber Security shops to this course. It seems indispensable."***

—KEIL HUBERT, 136TH COMM. FLIGHT

### 579.1 Hands On: Virtualization Security Architecture and Design \*

We'll cover the foundations of virtualization infrastructure and clarify the differences between server virtualization, desktop virtualization, application virtualization, and storage virtualization. We'll start with hypervisor platforms, covering the fundamental controls that should be set within VMware ESX and ESXi, Microsoft Hyper-V, and Citrix XenServer. You'll spend time analyzing virtual networks. We'll compare designs for internal networks and DMZs. Virtual switch types will be discussed, along with VLANs and PVLANs. We will cover virtual machine settings, with an emphasis on VMware VMX files. Tactics will be covered that help organizations better secure Fibre Channel, iSCSI, and NFS-based NAS technology.

**Topics:** Virtualization Components and Architecture Designs; Hypervisor Lockdown Controls for VMware; Microsoft Hyper-V, and Citrix Xen, Virtual Network Design Cases, Virtual Switches and Port Groups, Segmentation Techniques

### 579.2 Hands On: Virtualization & Private Cloud Infrastructure Security \*

Today starts with virtualization management. VMware vCenter, Microsoft System Center Virtual Machine Manager (SCVMM), and Citrix XenCenter will be covered. Virtual Desktop Infrastructure (VDI) will be covered with emphasis on security principles. Specific security-focused use cases for VDI, such as remote access and network access control, will be reviewed. We will take an in-depth look at virtual firewalls. Students will build a virtualized intrusion detection model; integrating promiscuous interfaces and traffic capture methods into virtual networks; and then setting up and configuring a virtualized IDS sensor. Attention will be paid to host-based IDS, with considerations for multitenant platforms.

### 579.3 Hands On: Virtualization Offense and Defense – Part 1 \*

In this session, we'll delve into the offensive side of security specific to virtualization and cloud technologies. While many key elements of vulnerability management and penetration testing are similar to traditional environments, there are many differences that we will cover. First, we'll cover a number of specific attack scenarios and models that represent the different risks organizations face in their virtual environments. Then we'll go through the entire penetration testing and vulnerability assessment lifecycle, with an emphasis on virtualization tools and technologies. Students will then learn about monitoring traffic and looking for malicious activity within the virtual network, and numerous network-based and host-based tools will be covered and implemented in class. Finally, students will learn about logs and log management in virtual environments.

### 579.4 Hands On: Virtualization Offense and Defense – Part 2 \*

This session is all about defense! We'll start off with an analysis on anti-malware techniques. We'll look at traditional antivirus, whitelisting, and other tools and techniques for combating malware, with a specific eye toward virtualization and cloud environments. New commercial offerings in this area will also be discussed to provide context, as well. The majority of this session will focus on incident response and forensics in a virtualized or cloud-based infrastructure. We'll walk students through the 6-step incident response cycle espoused by NIST and SANS, and highlight exactly how virtualization fits into the "big picture." Students will discuss and analyze incidents at each stage, again with a focus on virtualization and cloud. We'll finish the incident response section with processes and procedures organizations can put to use right away to improve their awareness of virtualization-based incidents.

### 579.5 Hands On: Virtualization and Cloud Integration: Policy, Operations, and Compliance \*

This session will explore how traditional security and IT operations changes with the addition of virtualization and cloud technology in the environment. Our first discussion will be a lesson on contrast! First, we'll present an overview of integrating existing security into virtualization. Then, we'll take a vastly different approach, and outline how virtualization actually creates new security capabilities and functions! This will really provide a solid grounding for students to understand just what a paradigm shift virtualization is, and how security can benefit from it, while still needing to adapt in many ways.

### 579.6 Hands On: Confidentiality, Integrity, and Availability with Virtualization and Cloud \*

Today's session will start off with a lively discussion on virtualization assessment and audit. You may be asking - how will you possibly make a discussion on auditing lively? Trust us! We'll cover the top virtualization configuration and hardening guides from DISA, CIS, Microsoft, and VMware, and talk about the most important and critical things to take away from these to implement. We'll really put our money where our mouth is next - students will learn to implement audit and assessment techniques by scripting with the VI CLI, as well as some Powershell and general shell scripting! Although not intended to be an in-depth class on scripting, some key techniques and ready-made scripts will be discussed to get students prepared for implementing these principles in their environments as soon as they get back to work.

*\*This course is available to Security 579 participants only.*



**SANS Senior Instructor**  
**Dave Shackelford**

Dave Shackelford is the owner and principal consultant at Voodoo Security; senior vice president of research and CTO at IANS; and a SANS analyst, instructor, and course author. He has consulted with hundreds of organizations in the areas of security, regulatory compliance, and network architecture and engineering. He is a VMware vExpert and has extensive experience designing and configuring secure virtualized infrastructures. He has previously worked as CSO for Configuresoft; CTO for the Center for Internet Security; and as a security architect, analyst, and manager for several Fortune 500 companies. Dave is a coauthor of *Hands-On Information Security* from Course Technology as well as the Managing Incident Response chapter in the Course Technology book *Readings and Cases in the Management of Information Security*. Recently, Dave coauthored the first published course on virtualization security for the SANS Institute. Dave currently serves on the board of directors at the SANS Technology Institute and helps lead the Atlanta chapter of the Cloud Security Alliance.



## SEC617: Wireless Ethical Hacking, Penetration Testing, and Defenses

Despite the security concerns many of us share regarding wireless technology, it is here to stay. In fact, not only is wireless here to stay, but it is growing in deployment and utilization with wireless LAN technology and WiFi as well as with other applications, including cordless telephones, smart homes, embedded devices, and more. Technologies like ZigBee and WiMAX offer new methods of connectivity to devices, while other wireless technology, including WiFi, Bluetooth and DECT, continue their massive growth rate, each introducing its own set of security challenges and attacker opportunities.

To be a wireless security expert, you need to have a comprehensive understanding of the technology, threats, exploits, and defense techniques along with hands-on experience in evaluating and attacking wireless technology. Not limiting your skill-set to WiFi, you'll need to evaluate the threat from other standards-based and proprietary wireless technologies as well. This course takes an in-depth look at the security challenges of many different wireless technologies, exposing you to wireless security threats through the eyes of an attacker. Using readily available and custom-developed tools, you'll navigate your way through the techniques attackers use to exploit WiFi networks, including attacks against WEP, WPA/WPA2, PEAP, TTLS, and other systems. You'll also develop attack techniques leveraging Windows 7 and Mac OS X. We'll also examine the commonly overlooked threats associated with Bluetooth, ZigBee, DECT, and proprietary wireless systems. As part of the course, you'll receive the SWAT Toolkit, which will be used in hands-on labs to back up the course content and reinforce wireless ethical hacking techniques.

Using assessment and analysis techniques, this course will show you how to identify the threats that expose wireless technology and build on this knowledge to implement defensive techniques that can be used to protect wireless systems.

*"In-depth information you need to know if you're responsible for securing wireless networks."*

-RYAN GRENNIER, COCC

*"The course offers an in-depth look at the how and why of wireless exploits. It gets you thinking again."*

-TODD HICK, BIMA



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### Who Should Attend

- Ethical hackers and penetration testers
- Network security staff
- Network and system administrators
- Incident response teams
- Information security policy decision makers
- Technical auditors
- Information security consultants
- Wireless system engineers
- Embedded wireless system developers

### You Will Be Able To

- Identify and locate malicious rogue access points using free and low-cost tools
- Conduct a penetration test against low-power wireless including ZigBee to identify control system and related wireless vulnerabilities
- Identify vulnerabilities and bypass authentication mechanisms in Bluetooth networks using Ubertooth, CarWhisperer, and btaptap to collect sensitive information from headsets, wireless keyboards and Bluetooth LAN devices
- Utilize wireless capture tools to extract audio conversations and network traffic from DECT wireless phones to identify information disclosure threats exposing the organization
- Implement an enterprise WPA2 penetration test to exploit vulnerable wireless client systems for credential harvesting
- Utilize wireless fuzzing tools including Metasploit, file2air, and Scapy to identify new vulnerabilities in wireless devices

***"This was a great in-depth look at every facet down to the protocol layer... great experience!"***

-KEITH WILSON,

DEPARTMENT OF DEFENSE

## Course Day Descriptions

### 617.1 Hands On: Wireless Data Collection & WiFi MAC Analysis \*

Students will identify the risks associated with modern wireless deployments as well as the characteristics of physical layer radio frequency systems, including 802.11a/b/g and pre-802.11n systems. Students will leverage open-source tools for analyzing wireless traffic and mapping wireless deployments.

**Topics:** Wireless Signal Exposure Threats; Identifying Threats in Wireless Networks; RF Signal Propagation and Transmission Characteristics; RF Antenna Gain Types and Concepts; Physical Layer Coding Mechanisms; Leveraging Tools Including Kismet, Wireshark, and gpsmap for Network Mapping and Identification

### 617.2 Hands On: Wireless Tools and Information Analysis \*

Students will develop an in-depth treatise on the IEEE 802.11 MAC layer and operating characteristics. Using passive and active assessment techniques, students will evaluate deployment and implementation weaknesses, auditing against common implementation requirements, including PCI and the DoD Directive 8100.2. Security threats introduced with rogue networks will be examined from a defensive and penetration-testing perspective. Threats present in wireless hotspot networks will also be examined, identifying techniques attackers can use to manipulate guest or commercial hotspot environment.

**Topics:** IEEE 802.11 Framing; AP Fingerprinting; Kismet Post-Processing; Assessing Information Disclosure Threats; Auditing Wireless Policy Compliance; Evading WIDS Systems with Custom Rogue APs; "Free Public WiFi" and Ad-Hoc Networks; Wireless Device Triangulation; Webmail Session Hijacking; Defensive Measures for Guest Network Deployment

### 617.3 Hands On: Client, Crypto, and Enterprise Attacks \*

Students will continue their assessment of wireless security mechanisms, such as the identification and compromise of static and dynamic WEP networks and exploiting weak authentication techniques, including the Cisco LEAP protocol. Next-generation wireless threats will be assessed, including attacks against client systems, such as network impersonation attacks and traffic manipulation. Students will evaluate the security and threats associated with common wireless MAN technology, including proprietary and standards-based solutions.

**Topics:** Introduction to The RC4 Cipher; Understanding Failures in WEP; Leveraging Advanced Tools to Accelerate WEP Cracking; Attacking MS-CHAPv2 Authentication Systems; Attacker Opportunities When Exploiting Client Systems; Manipulating Plaintext Network Traffic; Attacking the Preferred Network List on Client Devices; Network Impersonation Attacks; Risks Associated with WMAN Technology; Assessing WiMAX Flaws

### 617.4 Hands On: Advanced WiFi Attack Techniques \*

Part three covers the evaluation of modern wireless encryption and authentication systems, identifying the benefits and flaws in WPA/WPA2 networks and common authentication systems. Upper-layer encryption strategies for wireless security using IPSec are evaluated with in-depth coverage of denial-of-service attacks and techniques.

**Topics:** Threats Associated with the WPA/TKIP Protocol; Implementing Offline Wordlist Attacks Against WPA/WPA2-PSK Networks; Understanding the PEAP Authentication Exchange; Exploiting PEAP Through RADIUS Impersonation; Recommendations for Securing Windows XP Suppliants; Exploiting Wireless Firmware for DoS Attack; Wireless Packet Injection and Manipulation Techniques; VPN Network Fingerprinting and Analysis Tools

### 617.5 Hands On: Bluetooth, DECT and ZigBee Attacks \*

Advanced wireless testing and vulnerability discovery systems will be covered, including 802.11 fuzzing techniques. A look at other wireless technology, including proprietary systems, cellular technology, and an in-depth coverage of Bluetooth risks, will demonstrate the risks associated with other forms of wireless systems and the impact to organizations.

**Topics:** Wireless Fuzzing Tools and Techniques; Vulnerability Disclosure Strategies; Discovering Unencrypted Video Transmitters; Assessing Proprietary Wireless Devices; Traffic Sniffing in GSM Networks; Attacking SMS Messages and Cellular Calls; Bluetooth Authentication and Pairing Exchange; Attacking Bluetooth Devices; Sniffing Bluetooth Networks; Eavesdropping on Bluetooth Headsets

### 617.6 Hands On: Wireless Security Strategies and Implementation \*

The final day of the course evaluates strategies and techniques for protecting wireless systems. Students will examine the benefits and weaknesses of WLAN IDS systems while gaining insight into the design and deployment of a public key infrastructure (PKI). Students will also examine critical secure network design choices, including the selection of an EAP type, selecting an encryption strategy, and the management of client configuration settings.

**Topics:** WLAN IDS Signature and Anomaly Analysis Techniques; Understanding PKI Key Management Protocols; Deploying a Private Certificate Authority on Linux and Windows Systems; Configuring Windows IAS for Wireless Authentication; Configuring Windows XP Wireless Settings in Login Scripts

*\*This course is available to Security 617 participants only.*



**SANS Certified Instructor**

**Larry Pesce**

Larry is a Senior Security Consultant with NWN Corporation in Waltham, MA. He worked for many years in Security and Disaster Recovery in healthcare, performing penetration testing, wireless assessments and hardware hacking. He also directs a significant portion of his attention co-hosting the PaulDotCom Security Weekly podcast and likes to tinker with all things electronic and wireless, much to the disappointment of his family, friends and warranties. Larry also co-authored "Linksys WRT54G Ultimate Hacking" and "Using Wireshark and Ethereal" from Syngress. Larry is an Extra Class Amateur Radio operator (KB1TNF) and enjoys developing hardware and real-world challenges for the Mid-Atlantic Collegiate Cyber Defense Challenge.

*"This class will not only give you a basic understanding of wireless threats and vulnerabilities, but it can be as advanced as you want to make it with the questions that you ask."*

—DANIEL MAYERNIK,

INTEGRITY APPLICATIONS INCORPORATED

## SEC660: Advanced Penetration Testing, Exploits, and Ethical Hacking

This course is designed as a logical progression point for those who have completed SANS SEC560: Network Penetration Testing and Ethical Hacking, or for those with existing penetration testing experience. Students with the prerequisite knowledge to take this course will walk through dozens of real world attacks used by the most seasoned penetration testers. The methodology of a given attack is discussed, followed by exercises in a real world lab environment to solidify advanced concepts and allow for the immediate application of techniques in the workplace. Each day includes a two-hour evening bootcamp to allow for additional mastery of the techniques discussed and even more hands-on exercises. A sample of topics covered includes weaponizing Python for penetration testers, attacks against network access control (NAC) and VLAN manipulation, network device exploitation, breaking out of Linux and Windows restricted environments, IPv6, Linux privilege escalation and exploit-writing, testing cryptographic implementations, fuzzing, defeating modern OS controls such as ASLR and DEP, Return Oriented Programming (ROP), Windows exploit-writing, and much more!

Attackers are becoming more clever and their attacks more complex. In order to keep up with the latest attack methods, one must have a strong desire to learn, the support of others, and the opportunity to practice and build experience. SANS SEC660 engages attendees with in-depth knowledge of the most prominent and powerful attack vectors and an environment to perform these attacks in numerous hands-on scenarios. This course goes far beyond simple scanning for low-hanging fruit, and shows penetration testers how to model the abilities of an advanced attacker to find significant flaws in a target environment and demonstrate the business risk associated with these flaws.

SEC660 starts off by introducing advanced penetration concepts, and an overview to help prepare students for what lies ahead. The focus of day one is on network attacks, an area often left untouched by testers. Topics include accessing, manipulating, and exploiting the network. Attacks are performed against NAC, VLANs, OSPF, 802.1X, CDP, IPv6, VOIP, SSL, ARP, SNMP, and others. Day two starts off with a technical module on performing penetration testing against various cryptographic implementations. The rest of the day is spent on network booting attacks, escaping Linux restricted environments such as chroot, and escaping Windows restricted desktop environments. Day three jumps into an introduction of Python for penetration testing, Scapy for packet crafting, product security testing, network and application fuzzing, and code coverage techniques. Days four and five are spent exploiting programs on the Linux and Windows operating systems. You will learn to identify privileged programs, redirect the execution of code, reverse-engineer programs to locate vulnerable code, obtain code execution for administrative shell access, and defeat modern operating system controls such as ASLR, canaries, and DEP using Return Oriented Programming (ROP) and other techniques. Local and remote exploits, as well as client-side exploitation techniques are covered. The final course day is dedicated to numerous penetration testing challenges requiring you to solve complex problems and capture flags.

*"This course is an excellent tour into the advanced skills needed for current/effective penetration."*

-MATTHEW SMITH,  
U.S. DEPT. OF HOMELAND SECURITY

*"Most comprehensive coverage of fuzzing. I would have signed up for the course for that alone."*

-ADAM KLIARSKY,  
CEDARS-SINAI MEDICAL CENTER

### Who Should Attend

- Network and Systems Penetration Testers
- Incident Handlers
- Application Developers
- IDS Engineers

### You Will Be Able To

- Perform fuzz testing to enhance your company's SDL process
- Exploit network devices and assess network application protocols
- Escape from restricted environments on Linux and Windows
- Test cryptographic implementations
- Model the techniques used by attackers to perform 0-day vulnerability discovery and exploit development
- Develop more accurate quantitative and qualitative risk assessments through validation
- Demonstrate the needs and effects of leveraging modern exploit mitigation controls
- Reverse engineer vulnerable code to write custom exploits

*"The breadth and depth of information that this course covers in spectacular detail shines with the glory of a thousand suns."*

-JACOB HORNE, DEPARTMENT OF DEFENSE



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## Course Day Descriptions

### 660.1 Hands On: Network Attacks for Penetration Testers \*

Day one serves as an advanced network attack module, building on knowledge gained from SEC560: Network Penetration Testing and Ethical Hacking. The focus will be on obtaining access to the network; manipulating the network to gain an attack position for eavesdropping and attacks, and for exploiting network devices; leveraging weaknesses in network infrastructure; and taking advantage of client frailty.

**Topics:** Bypassing Network Admission Control; Impersonating Devices with Admission Control Policy Exceptions; Exploiting EAP-MD5 Authentication; IEEE 802.1X authentication; Custom Network Protocol Manipulation with Ettercap and Custom Filters; Multiple Techniques for Gaining Man-in-the-Middle Network Access; Exploiting OSPF Authentication to Inject Malicious Routing Updates; Using Evilgrade to Attack Software Updates; Overcoming SSL Transport Encryption Security with Sslstrip; Remote Cisco Router Configuration File Retrieval

### 660.2 Hands On: Crypto, Network Booting Attacks, and Escaping Restricted Environments \*

Day two starts by taking a tactical look at techniques penetration testers can use to investigate and exploit common cryptography mistakes. We begin by building some fundamental knowledge on how ciphers operate without getting bogged down in complex mathematics, and then we move on to techniques for identifying, assessing, and attacking real-world crypto implementations. We finish the module with lab exercises that allow you to practice your new found crypto attack skill set against reproduced real-world application vulnerabilities.

**Topics:** Low Profile Enumeration of Large Windows Environments Without Heavy Scanning; Strategic Target Selection; Remote Desktop Protocol (RDP) and Man-in-the-Middle Attacks; Windows Network Authentication Attacks (e.g., MS-Kerberos, NTLMv2, NTLMv1, LM); Windows Network Authentication Downgrade; Discovering and Leveraging MS-SQL for Domain Compromise Without Knowing the sa Password; Metasploit Tricks to Attack Fully Patched Systems; Utilize LSA Secrets and Service Accounts to Dominate Windows Targets; Dealing with Unguessable/Uncrackable Passwords; Leveraging Password Histories; Gaining Graphical Access; Expanding Influence to Non-Windows Systems

### 660.3 Hands On: Python, Scapy, and Fuzzing \*

Day three brings together multiple skill sets needed for creative analysis in penetration testing. The day starts with a focus on how to leverage Python as a penetration tester. It is designed to help people unfamiliar with Python start modifying scripts to add their own functionality while helping seasoned Python scripters improve their skills. Once we leverage the Python skills in creative lab exercises, we move on to leveraging Scapy for custom network targeting and protocol manipulation. Using Scapy, we examine techniques for transmitting and receiving network traffic beyond what canned tools can accomplish, including IPv6.

**Topics:** Becoming Familiar with Python Types; Leveraging Python Modules for Real-World Pen Tester Tasks; Manipulating Stateful Protocols with Scapy; Using Scapy to Create a Custom Wireless Data Leakage Tool; Product Security Testing; Using Taof for Quick Protocol Mutation Fuzzing; IDAPro; Optimizing Your Fuzzing Time with Smart Target Selection; Automating Target Monitoring While Fuzzing with Sulley; Leveraging Microsoft Word Macros for Fuzzing .docx files; Block-Based Code Coverage Techniques Using Paimeir

### 660.4 Hands On: Exploiting Linux for Penetration Testers \*

Day Four begins by walking through memory from an exploitation perspective as well as introducing x86 assembler and linking and loading. These topics are important to understand for anyone performing penetration testing at an advanced level. Processor registers are directly manipulated by testers and must be intimately understood. Disassembly is a critical piece of testing and will be used throughout the remainder of the course. We will take a look at the Linux OS from an exploitation perspective and discuss the topic of privilege escalation. We continue by describing how to look for SUID programs and other likely points of vulnerabilities and misconfigurations. The material will focus on techniques that are critical to performing penetration testing on Linux applications.

**Topics:** Stack and Dynamic Memory Management and Allocation on the Linux OS; Disassembling a Binary and Analyzing x86 Assembly Code; Performing Symbol Resolution on the Linux OS; Identifying Vulnerable Programs; Code Execution Redirection and Memory Leaks; Return Oriented Programming (ROP); Identifying and Analyzing Stack-Based Overflows on the Linux OS; Performing Return-to-libc (ret2libc) Attacks on the Stack; Defeating Stack Protection on the Linux OS; Defeating ASLR on the Linux OS

### 660.5 Hands On: Exploiting Windows for Penetration Testers \*

On day five we start off with covering the OS security features (ALSR, DEP, etc.) added to the Windows OS over the years, as well as Windows specific constructs, such as the process environment block (PEB), structured exception handling (SEH), thread information block (TIB), and the Windows API. Differences between Linux and Windows will be covered. These topics are critical in assessing Windows-based applications. We then focus on stack-based attacks against programs running on the Windows OS. We look at fuzzing skills, which are required to test remote services, such as TFTP and FTP, for faults. Once a fault is discovered, the student will work with Immunity Debugger to turn the fault into an opportunity for code execution and privilege escalation. Advanced stack-based attacks, such as disabling data execution prevention (DEP) and heap spraying for browser-based applications, are covered. Client-side exploitation will be introduced, as it is a highly common area of attack. The day will end with a look at shellcode and the differences between Linux and Windows.

**Topics:** The State of Windows OS Protections on XP, Vista, 7, Server 2003 and 2008; Understanding Common Windows Constructs; Stack Exploitation on Windows; Defeating OS protections added to Windows; Dynamic and Static Fuzzing on Windows Applications or Processes; Creating a Metasploit Module; Advanced Stack-Smashing on Windows; Return Oriented Programming (ROP); Windows 7 and Windows 8; Porting Metasploit Modules; Client-side Exploitation; Windows and Linux Shellcode

### 660.6 Hands On: Capture the Flag \*

This day will serve as a real-world challenge for students, requiring them to utilize skills obtained throughout the course, think outside the box, and solve simple-to-complex problems. In this offensive exercise, challenges range from local privilege escalation to remote exploitation on both Linux and Windows systems, as well as networking attacks and other challenges related to the course material.

*\*This course is available to Security 660 participants only.*



**SANS Senior Instructor  
Stephen Sims**

Stephen Sims is an industry expert with over 15 years of experience in information technology and security. Stephen currently works out of San Francisco as a consultant. He has spent many years performing security architecture, exploit development, reverse engineering, and penetration testing. Stephen has an MS in information assurance from Norwich University. He is the author of SANS' only 700-level course, SEC710: Advanced Exploit Development, which concentrates on complex heap overflows, patch diffing, and client-side exploits. Stephen is also the lead author on SEC660: Advanced Penetration Testing, Exploits, and Ethical Hacking. He holds the GIAC Security Expert (GSE) certification as well as the CISSP, CISA, Immunity NOP, and many other certifications. In his spare time Stephen enjoys snowboarding and writing music.

*"The crypto labs were awesome; they brought some hands-on work to crypto where most people stay theoretical."*

—MICHAEL ANDERSON, NetSPI

## FOR408: Computer Forensic Investigations – Windows In-Depth

Master computer forensics. Learn critical investigation techniques. With today's ever-changing technologies and environments, it is inevitable that every organization will deal with cybercrime including fraud, insider threats, industrial espionage, and phishing. In addition, government agencies are now performing media exploitation to recover key intelligence kept on adversary systems. In order to help solve these cases, organizations are hiring digital forensic professionals and are calling cybercrime law enforcement agents to piece together what happened in these cases.

**FOR408: Computer Forensic Investigations – Windows In-Depth** focuses on the critical knowledge of the Windows OS that every digital forensic analyst must know to investigate computer incidents successfully. You will learn how computer forensic analysts focus on collecting and analyzing data from computer systems to track user-based activity that could be used internally or in civil/criminal litigation.

This course covers the fundamental steps of the in-depth computer forensic and media exploitation methodology so that each student will have the complete qualifications to work as a computer forensic investigator in the field helping solve and fight crime. In addition to in-depth technical digital forensic knowledge on Windows Digital Forensics (Windows XP through Windows 8 and Server 2008) you will be exposed to well known computer forensic tools such as Access Data's Forensic Toolkit (FTK), Guidance Software's EnCase, Registry Analyzer, FTK Imager, Prefetch Analyzer, and much more. Many of the tools covered in the course are freeware, comprising a full-featured forensic laboratory that students can take with them.

*"Hands down the BEST forensics class EVER!! Blew my mind at least once a day for 6 days!"*

-JASON JONES, USAF

*"This is a very high-intensity course with extremely current course material that is not available anywhere else in my experience."*

-ALEXANDER APPLEGATE,  
AUBURN UNIVERSITY

FIGHT CRIME. UNRAVEL INCIDENTS... ONE BYTE AT A TIME.



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Digital Forensics and Incident Response  
<http://computer-forensics.sans.org>

### What you will receive with this course

- Windows version of the SIFT Workstation Virtual Machine
- Windows 8 Standard Full Version License and Key for the Windows SIFT Workstation
- Full License to AccessData FTK and Guidance Software EnCase for a 3 month trial
- Full License to MagnetForensics Internet Evidence Finder for a 15 day trial
- Two full real-world cases to examine during class
- Course DVD loaded with case examples, tools, and documentation
- Wiebetech Ultradock v5 Write Blocker Kit



### Who Should Attend

- Information technology professionals
- Incident response team members
- Law enforcement officers, federal agents, or detectives
- Media exploitation analysts
- Information security managers
- Information technology lawyers and paralegals
- Anyone interested in computer forensic investigations

### You Will Be Able To

- Perform proper Windows forensic analysis, determine who placed an artifact on the system and how they did it by applying key analysis techniques covering Windows XP through Windows 8
- Use full-scale forensic tools and analysis methods to detail every action a suspect accomplished on a Windows system – and determine program execution, file/folder opening, geo-location, browser history, USB devices, and more
- Uncover the exact time that a specific user last executed a program through Registry analysis, Windows artifact analysis, and email analysis. Over time that is key to proving intent in many cases such as intellectual property theft, hacker breached systems, and traditional crimes
- Demonstrate every time a file has been opened by a suspect through IE browser forensics, shortcut file analysis (LNK), email analysis and Registry parsing • Use automated analysis techniques via AccessData's Forensic Toolkit (FTK)
- Identify key words searched for by a specific user on a Windows system that can be used to identify files that the suspect was interested in finding
- Use shellbags analysis tools to articulate every folder and directory that a user opened up while he was browsing through the hard drive
- Determine each time a unique and specific USB device is attached to the Windows system, the files and folders that were accessed on it, and who plugged it in via tools parsing key Windows artifacts such as the Registry and log files
- Examine how a user logged into a Windows system through a remote session, at the keyboard, or simply unlocking their screensaver by viewing the logon types in the Windows security event logs
- Use FTK Registry Viewer, pinpoint geo-location of a Windows system through the examination of the networks they have connected to, browser search terms, and cookie data to determine where a crime was committed
- Use Web Historian, recover browser history of a suspect who has attempted to clear their trail using in-private browsing through the recovery of session restore points and flash cookies

### 408.1 Digital Forensics Fundamentals and Evidence Acquisition \*

Securing or “Bagging and Tagging” digital evidence can be tricky. Each computer forensic examiner should be familiar with different methods of successfully acquiring it while maintaining the integrity of the evidence. Starting with the foundations from law enforcement training in proper evidence handling procedures, you will learn firsthand the best methods for acquiring evidence in a case. You will utilize the Tableau T35es write blocker, part of your SIFT Essentials kit, to obtain evidence from a hard drive using the most popular tools utilized in the field. You will learn how to utilize toolkits to obtain memory, encrypted or unencrypted hard disk images, or protected files from a computer system that is running or powered off.

**Topics:** Purpose of Forensics: Investigative Mindset, Focus on the Fundamentals; Evidence Fundamentals: Admissibility, Authenticity, Threats against Authenticity; Reporting and Presenting Evidence: Taking Notes, Report Writing Essentials, Best Practices for Presenting Evidence: Tableau Write Blocker Utilization, Access Data's FTK Imager, Access Data's FTK Imager Lite; Evidence Acquisition Basics; Preservation of Evidence: Chain of Custody, Evidence Handling, Evidence Integrity

### 408.2 Hands On: Core Windows Forensics Part I – String Search, Data Carving, and E-mail Forensics

You will learn how to recover deleted data from the evidence, perform string searches against it using a word list, and begin to piece together the events that shaped the case. Today's course is critical to anyone performing digital forensics to learn the most up-to-date techniques of acquiring and analyzing digital evidence. Email Forensics: Investigations involving email occur every day. However, email examinations require the investigator to pull data locally, from an email server, or even recover web-based email fragments from temporary files left by a web browser. Email has become critical in a case and the investigator will learn the critical steps needed to investigate Outlook, Exchange, Webmail, and even Lotus Notes email cases.

**Topics:** Recover Deleted Files: Automated Recovery, String Searches, Dirty Word Searches; Email Forensics: How Email Works, Locations, Examination of Email, Types of Email Formats; Microsoft Outlook/Outlook Express; Web-Based Mail; Microsoft Exchange; Lotus Notes; E-mail Analysis, E-mail Searching and Examination

### 408.3 Hands On: Core Windows Forensics Part II – Registry and USB Device Analysis

Each examiner will learn how to examine the Registry to obtain user profile data and system data. The course will also teach each forensic investigator how to show that a specific user performed key word searches, ran specific programs, opened and saved files, and list the most recent items that were used. Finally, USB Device investigations are becoming more and more a key part of performing computer forensics. We will show you how to perform in-depth USB device examinations on Windows 7, Vista, and Windows XP machines.

**Topics:** Registry Forensics In-Depth; Registry Basics; Core System Information; User Forensic Data; Evidence of Program Execution; Evidence of File Download; USB Device Forensic Examinations

### 408.4 Hands On: Core Windows Forensics Part III – Artifact and Log File Analysis

Suspects unknowingly create hundreds of files that link back to their actions on a system. Learn how to examine key files such as link files, the windows prefetch, pagefile/system memory, and more. The latter part of the section will center on examining the Windows log files and the usefulness in both simple and complex cases.

**Topics:** Memory, Pagefile, and Unallocated Space Analysis; Forensics of Files Containing Critical Digital Forensic Evidence; Windows Event Log Digital Forensic Analysis

### 408.5 Hands On: Core Windows Forensics Part IV – Web Browser Forensics

Internet Explorer and Firefox Browser Digital Forensics. Learn how to examine exactly what an individual did while surfing via their Web browser. The results will give you pause the next time you use the web.

**Topics:** Browser Forensics: History, Cache, Searches, Downloads, Understanding of Browser Timestamps, Internet Explorer; Firefox

### 408.6 Hands On: Digital Forensic Challenge and Mock Trial

Windows Vista/7 Based Digital Forensic Challenge. There has been a murder-suicide and you are the investigator assigned to process the hard drive. This day is a capstone for every artifact discussed in the class. You will use this day to solidify the skills you have learned over the past week.

**Topics:** Digital Forensic Case; Mock Trial

*\*This course is available to Forensics 408 participants only.*



SANS Faculty Fellow

**Rob Lee**

Rob Lee is an entrepreneur and consultant in the Washington D.C. area and currently the Curriculum Lead and author for digital forensic and incident response training at the SANS Institute in addition to owning his own firm. Rob has more than 15 years' experience in computer forensics, vulnerability and exploit development, intrusion detection/prevention, and incident response. Rob graduated from the U.S. Air Force Academy and earned his MBA from Georgetown University. He served in the U.S. Air Force as a member of the 609th Information Warfare Squadron (IWS), the first U.S. military operational unit focused on information warfare. Later, he was a member of the Air Force Office of Special Investigations (AFOSI) where he led crime investigations and an incident response team. Over the next 7 years, he worked directly with a variety of government agencies in the law enforcement, U.S. Department of Defense, and intelligence communities as the technical lead for a vulnerability discovery and an exploit development team, lead for a cyber-forensics branch, and lead for a computer forensic and security software development team. Most recently, Rob was a Director for MANDIANT, a commercial firm focusing on responding to advanced adversaries such as the APT. Rob co-authored the book *Know Your Enemy*, 2nd Edition. Rob is also co-author of the MANDIANT threat intelligence report *M-Trends: The Advanced Persistent Threat*. Rob frequently contributes articles at the SANS Blog <http://computer-forensics.sans.org>.



## FOR508: Advanced Computer Forensic Analysis and Incident Response

This course focuses on providing incident responders with the necessary skills to hunt down and counter a wide range of threats within enterprise networks, including economic espionage, hactivism, and financial crime syndicates. The completely updated FOR508 addresses today's incidents by providing real-life, hands-on response tactics.

**DAY 0: A 3-letter government agency contacts you to say that critical information was stolen from a targeted attack on your organization. Don't ask how they know, but they tell you that there are several breached systems within your enterprise. You are compromised by an Advanced Persistent Threat, aka an APT – the most sophisticated threat you are likely to face in your efforts to defend your systems and data.**

Over 90% of all breach victims learn of a compromise from third party notification, not from internal security teams. In most cases, adversaries have been rummaging through your network undetected for months or even years. Gather your team—it's time to go hunting.

**FOR508: Advanced Computer Forensic Analysis and Incident Response** will help you determine:

- How did the breach occur?
- What systems were compromised?
- What did they take? What did they change?
- How do we remediate the incident?

The updated FOR508 trains digital forensic analysts and incident response teams to identify, contain, and remediate sophisticated threats—including APT groups and financial crime syndicates. A hands-on lab—developed from a real-world targeted attack on an enterprise network—leads you through the challenges and solutions. You will identify where the initial targeted attack occurred and which systems an APT group compromised. The course will prepare you to find out which data were stolen and by whom, contain the threat, and provide your organization the capabilities to manage and counter the attack.

### What you will receive with this course

- SIFT Workstation Virtual Machine
- F-Response TACTICAL Edition with a 2 year license
- Best-selling book "File System Forensic Analysis" by Brian Carrier
- 64 GB SANS DFIR USB Key loaded to the brim with Windows XP, Win7, Win2008R2 live response data, memory images, and full system hard drive images of a compromised enterprise network
- Course DVD loaded with case examples, additional tools, and documentation

During a targeted attack, an organization needs the best incident responders and forensic analysts in the field. FOR508 will train you and your team to be ready to do this work.

*"Excellent course, invaluable hands-on experience taught by people who not only know the tools and techniques, but know their quirks through practical, real-world experience."*

—JOHN ALEXANDER, US ARMY

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast. More info on page 70.

*"The SANS FOR508 course exceeded my expectations in every way. It provided me the skills, knowledge, and tools to effectively respond to and handle apts and other enterprise-wide threats."*

—JOSH MOULIN, NSTEC/NNSA/DOE

### Who Should Attend

- Information security professionals
- Incident response team members
- Experienced digital forensic analysts
- Federal agents and law enforcement
- Red team members, penetration testers, and exploit developers
- SANS FOR408 and SEC504 graduates

### You Will Be Able To

- Apply incident response processes, threat intelligence, and digital forensics to investigate breached enterprise environments from Advanced Persistent Threat (APT) groups, organized crime syndicates, or hacktivists
- Discover every system compromised in your enterprise utilizing incident response tools such as F-Response and digital forensic analysis capabilities in the SIFT Workstation to identify APT beach head and spear phishing attack mechanisms, lateral movement, and data exfiltration techniques
- Use the SIFT Workstation's capabilities, perform forensic analysis and incident response on any remote enterprise hard drive or system memory without having to image the system first, allowing for immediate response and scalable analysis to take place across the enterprise
- Use system memory and the Volatility toolset to discover active malware on a system, determine how the malware was placed there, and recover it to help develop key threat intelligence to perform proper scoping activities during incident response
- Detect advanced capabilities such as Stuxnet, TDSS, or APT command and control malware immediately through memory analysis using Redline's Malware Rating Index (MRI) to quickly ascertain the threat to your organization and aid in scoping the true extent of the data breach
- Track the exact footprints of an attacker crossing multiple systems and observe data they have collected to exfiltrate as you track your adversary's movements in your network via timeline analysis using the log2timeline toolset
- Begin recovery and remediation of the compromise via the use of Indicators of Compromise (IOC), Threat Intelligence, and IR/Forensics key scanning techniques to identify active malware and all enterprise systems affected by the breach
- Perform filesystem surgery using the sleuthkit tool to discover how filesystems work and uncover powerful forensic artifacts such as NTFS \$130 directory file indexes, journal parsing, and detailed Master File Table analysis
- Use volume shadow snapshot examinations, XP restore point analysis, and NTFS examination tools in the SIFT Workstation, recover artifacts hidden by anti-forensic techniques such as timestomping, file wiping, rootkit hiding, and privacy cleaning
- Discover an adversary's persistence mechanisms to allow malware to continue to run on a system after a reboot using command-line tools such as autoruncs, psexec, jobparser, group policy, triage-ir, and IOCFinder



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## Course Day Descriptions

### 508.1 Hands On: Enterprise Incident Response\*

Incident responders should be armed with the latest tools, memory analysis techniques, and enterprise scanning methodologies in order to identify, track and contain advanced adversaries, and remediate incidents. Incident response and forensic analysts responding must be able to scale their examinations from the traditional one analyst per system toward one analyst per 1,000 or more systems. Enterprise scanning techniques are now a requirement to track targeted attacks by an APT group or crime syndicate groups which propagate through thousands of systems.

**Topics:** SIFT Workstation Overview; Incident Response Methodology; Threat and Adversary Intelligence; Intrusion Digital Forensics Methodology; Remote and Enterprise IR System Analysis; Windows Live Incident Response

### 508.2 Hands On: Memory Forensics\*

Critical to many IR teams detecting advanced threats in the organization, memory forensics has come a long way in just a few years. It can be extraordinarily effective at finding evidence of worms, rootkits, and advanced malware used by an APT group of attackers. While traditionally solely the domain of Windows internals experts, recent tools now make memory analysis feasible for anyone. Better interfaces, documentation, and built-in detection heuristics have greatly leveled the playing field. This section will introduce some of the newest free tools available and give you a solid foundation in adding core and advanced memory forensic skills to your incident response and forensics armory.

**Topics:** Memory Acquisition and Analysis; Memory Analysis Techniques with Redline; Live Memory Forensics; Advanced Memory Analysis with Volatility

### 508.3 Hands On: Timeline Analysis\*

Timeline Analysis will change the way you approach digital forensics and incident response... forever. Learn advanced analysis techniques uncovered via timeline analysis directly from the developers who pioneered timeline analysis tradecraft. Temporal data is located everywhere on a computer system. Filesystem modified/access/creation/change times, log files, network data, registry data, and, Internet history files all contain time data that can be correlated into critical analysis to successfully solve cases. New timeline analysis frameworks provide the means to conduct simultaneous examinations of a multitude of time based artifacts. Analysis that once took days now takes minutes. This section will step you through the two primary methods of creating and analyzing timelines created during advanced incidents and forensic cases.

**Topics:** Timeline Analysis Overview; Filesystem Timeline Creation and Analysis; Windows Time Rules (File Copies vs. File Moves); Filesystem Timeline Creation using Sleuthkit and fls; Super Timeline Creation and Analysis; Super Timeline Artifact Rules; Timeline Creation with log2timeline; Super Timeline Analysis

### 508.4 Hands On: Deep Dive Forensics and Anti-Forensics Detection\*

A major criticism of digital forensic professionals is that many tools simply require a few mouse clicks to have the tool automatically recover data for evidence. This "push button" mentality has led to inaccurate case results in the past few years in high profile cases such as the Casey Anthony Murder trial. You will stop being reliant on "push button" forensic techniques as we cover how the engines of digital forensic tools really work. To understand how to carve out data, it is best to understand how to accomplish it by hand and show how automated tools should be able to recover the same data.

**Topics:** Windows XP Restore Point Analysis; VISTA , Windows 7, Server 2008 Shadow Volume Copy Analysis; Deep Dive Forensics Analysis; Data Layer Analysis; Stream-Based Data Carving; File-Based Data Carving; NTFS Filesystem Analysis; FAT/exFAT Filesystem Overview

### 508.5 Hands On: Intrusion Forensics – The Art of Finding Unknown Malware – Part 1\*

The adversaries are good, we must be better. Over the years, we have observed that many incident responders have a challenging time finding malware without effective indicators of compromise (IOCs) or threat intelligence gathered prior to a breach. This is especially true in APT group intrusions. This advanced session will demonstrate techniques used by first responders to discover malware or forensic artifacts when very little information exists about their capabilities or hidden locations. We will discuss techniques to help funnel possibilities down to the candidates most likely to be evil malware trying to hide on the system.

**Topics:** Step-by-Step Finding Unknown Malware On A System; Anti-Forensics Detection Methodologies; Methodology to Analyze and Solve Challenging Cases

### 508.5 Hands On: Computer Investigative Law For Forensic Analysts – Part 2\*

Note this is a half day section. Learn to investigate incidents while minimizing the risk for legal trouble. This course is designed not for management, but for the Digital Forensic and Incident Response team leaders in charge of an investigation. The content focuses on challenges that every lead investigator needs to understand before, during, and post investigation. Since most investigations could potentially bring a case to either a criminal or civil courtroom, it is essential for you to understand how to perform a computer-based investigation legally and ethically.

**Topics:** Who Can Investigate and Investigative Process Laws; Evidence Acquisition/Analysis/Preservation Laws and Guidelines; Laws Investigators Should Know; Forensic Reports and Testimony

### 508.6 Hands On: The Incident Response & Intrusion Forensic Challenge\*

This brand new exercise brings together some of the most exciting techniques learned earlier in the week and tests your newly acquired skills in a case that simulates an attack by an advanced adversary such as an APT. This challenge brings it all together using a simulated intrusion into a real enterprise environment consisting of multiple Windows systems. You will be asked to uncover how the systems were compromised in the initial intrusion, find other systems the adversary moved to laterally, and identify intellectual property stolen via data exfiltration. You will walk out of the course with hands-on experience investigating realistic scenarios, which were put together by a cadre of individuals with many years of experience fighting advanced threats such as an APT group.

\*This course is available to Forensics 508 participants only.



#### SANS Certified Instructor Chad Tilbury

Chad Tilbury has spent over twelve years responding to computer intrusions and conducting forensic investigations. His extensive law enforcement and international experience stems from working with a broad cross-section of Fortune 500 corporations and government agencies around the world. During his service as a Special Agent with the Air Force Office of Special Investigations, he investigated and conducted computer forensics for a variety of crimes, including hacking, abduction, espionage, identity theft, and multi-million dollar fraud cases. He has led international forensic teams and was selected to provide computer forensic support to the United Nations Weapons Inspection Team. Chad has worked as a computer security engineer and forensic lead for a major defense contractor and as the Vice President of Worldwide Internet Enforcement for the Motion Picture Association of America. In that role, he managed Internet anti-piracy operations for the seven major Hollywood studios in over sixty countries. Chad is a graduate of the U.S. Air Force Academy and holds a B.S. and M.S. in Computer Science as well as GCFA, GCIH, GREM, and ENCE certifications. He is currently a consultant specializing in incident response, corporate espionage, and computer forensics.

**NEW!**

## FORENSICS 526

Five-Day Program | Mon, Sept 16 - Fri, Sept 20 | 9:00am - 5:00pm

Laptop Required | 30 CPE/CMU Credits | Instructor: Alissa Torres

# FOR526: Windows Memory Forensics In-Depth

**FOR526 - Memory Analysis In-Depth** is a critical course for any serious investigator who wishes to tackle advanced forensic and incident response cases. Memory analysis is now a crucial skill for any investigator who is analyzing intrusions.

**Malware can hide, but it must run** – the malware paradox is key to understanding that while intruders are becoming more advanced with anti-forensic tactics and techniques, it is impossible to hide their footprints completely from a skilled incident responder performing memory analysis. Learn how memory analysis works by learning about memory structures and context, memory analysis methods, and the current tools used to parse system ram.

Attackers will use anti-forensic techniques to hide their tracks. They use rootkits, file wiping, timestamp adjustments, privacy cleaners, and complex malware to hide in plain sight avoiding detection by standard host-based security measures. Every action that adversaries make will leave a trace; you merely need to know where to look. Memory analysis will give you the edge that you need in order to discover advanced adversaries in your network.

**FOR526 - Memory Analysis In-Depth** is one of the most advanced courses in the SANS Digital Forensics and Incident Response Curriculum. This cutting-edge course covers everything you need to step through memory analysis like a pro.

**FIGHT CRIME. UNRAVEL INCIDENTS... ONE BYTE AT A TIME.**



Digital Forensics and Incident Response  
<http://computer-forensics.sans.org>

***"Totally awesome,  
relevant and eye opening.  
I want to learn more  
every day."***

–MATTHEW BRITTON,  
BLUE CROSS BLUE SHIELD  
OF LOUISIANA



***"The presentation, exercises,  
labs, and data provided are  
the best in the computer forensics industry."***

–REBECCA PASSMORE, FBI

***"This is the best SANS course  
I have taken so far with  
the best instructor. I hope  
to take more classes in the  
future."***

–JONATHAN HINSON, DUKE ENERGY

## Who Should Attend

- Incident response team members
- Law enforcement officers
- Forensic examiners
- Malware analysts
- Information technology professionals
- System administrators
- And anybody who plays a part in the acquisition, preservation, forensics, or analysis of Microsoft Windows computers.

## You Will Be Able To

- Utilize stream-based data parsing tools to extract AES-encryption keys from a physical memory image to aid in the decryption of encryption files & volumes such as TrueCrypt & BitLocker
- Gain insight into the current network activity of the host system by retrieving network packets from a physical memory image and examining it with a network packet analyzer
- Inspect a Windows crash dump to discern processes, process objects and current system state at the time of crash through use of various debugging tools such as kd, WinDBG, and livekd
- Conduct Live System Memory Analysis with the powerful SysInternal's tool, Process Explorer, to collect real-time data on running processes allowing for rapid triage
- Use the SIFT workstation and in-depth knowledge of PE File modules in physical memory, extract and analyze packed and non-packed PE binaries from memory and compare them to their known disk-bound files
- Discover key features from memory such as the BIOS keyboard buffer, Kernel Debugging Data Block (KDBG), Executive Process (EPROCESS) structures, and handles based on signature and offset searching, gaining a deeper understanding of the inner workings of popular memory analysis tools
- Analyze memory structures using high-level and low-level techniques to reveal hidden and terminated processes and extract processes, drivers, and memory sections for further analysis
- Use a variety of means to capture memory images in the field, explaining the advantages and limitations of each method



### 526.1 Hands On: Unstructured Memory\*

Memory forensics is the study of operating systems, and operating systems, in turn, work extensively with the processor and its architecture. Before we can begin a meaningful analysis of the operating system, we must therefore understand how the underlying components work and fit together. This section explains a number of technologies that are used in modern computers and how they have evolved to where they are today. Computer memory is a fantastic resource for the forensic investigator even without considering any operating system structures. There are data in memory that are simply not found anywhere else. Without even knowing which operating system was being used, an examiner can glean information that could be critical to a case. These data are generated by the underlying architecture or standards outside of the operating system. In particular, we focus on encryption keys and network packets. These two resources are not part of traditional forensics, but can provide invaluable data to the memory forensics investigator! While conducting brute force searches for these structures, we are also starting to gather data for examining the operating system later on. Unlike disk forensics, there is no volume header to parse in memory. Instead, we must find values created by the operating system by searching for them manually. There are a number of structures that we can search for which will help us determine what operating system was being used, and the values particular to this execution.

**Topics:** Computer Architectures; Virtual Memory Models; Implementing the Virtual Memory Model; Process Memory; System Memory; BIOS Keyboard Buffer; Encryption Keys; Network Packets; Traditional Data; Preparing for Structured Analysis; The SIFT Workstation; Pool Memory; Walking vs. Scanning

### 526.2 Hands On: User Visible Structures\*

Most users are familiar with processes on a Windows system, but not necessarily with how they work under the hood. In this section, we will talk about the operating system components that make up a process, how they fit together, and how they can be exploited by malicious software. We will start with the basics of each process, how it was started, where the executable lives, and what command line options were used. Next will be the Dynamic Link Libraries (DLLs) used by a program and how they are found and loaded by the operating system. Finally, we will talk about the operating system structures involved with threads, the actual blocks of executing code that make up the interactive portion of every process.

**Topics:** Processes; Dynamic-link Libraries (DLLs); Drivers; Sockets; Kernel Objects; Threads

### 526.3 Hands On: Operating System Internals\*

There are a tremendous number of structures used in Microsoft Windows. To understand what the operating system is doing, we have to understand these components. In this section we will begin to explore the complex web of interconnected data structures which make up the operating system. To that end we start with a basic introduction to C structures and how they are put together. From there we talk about which of them are used in Windows and the documentation Microsoft publishes about them. In this section we will explore, in-depth, all of the components which constitute Microsoft Windows operating systems. We will start with processes and all of the data they contain. From there we will discuss DLLs, drivers, sockets, kernel objects, threads, modules, and virtual address descriptors. For each of these areas we will talk about how these systems work, what data the operating system maintains, which of those are relevant for forensics, and how to determine if there is something suspicious occurring.

**Topics:** Introduction to C Structures; Microsoft Structures; Tools for Structures; Modules; Injected and Unpacked Code; Finding hidden DLLs; Finding Hidden Processes; Driver Hooking

### 526.4 Hands On: Memory Forensics in the Real World\*

Knowing the basics of memory forensics allows us to begin doing it in the real world. First, we must acquire memory images. On any given system there may already be memory images, from the machine's past, which contain highly valuable information. In this section we will discuss how to find and recover such memory images. We'll also cover some of the tools to capture memory images and how to choose the one which is best for you.

**Topics:** The Windows Registry; Hibernation Files; Crash Dump Files; Memory Imaging; Traditional Imaging Programs; Suspended Virtual Machine; USB; Firewire; Cold Boot Method

### 526.5 Hands On: Memory Challenges\*

This section will present a number of challenges for the memory forensic examiner. We do not want to spoil all of the surprises by listing them in the outline, but we can give you a sense of what you will be working on. These memory images may contain some kind of malicious software or data of interest. Each challenge will provide a little information to go on. (As with real-world examinations, of course, it's never enough information!) Your job will be to determine if there is anything of interest, and if so, what it is.

*\*This course is available to Forensics 526 participants only.*



**SANS Certified Instructor**  
**Alissa Torres**

Alissa Torres is an incident handler at Mandiant, finding evil on a daily basis. She previously worked as a security researcher at KEYW Corporation, leading research and development initiatives in forensic and offensive methodologies and is co-founder of Torrora, LLC, a forensics consulting company. Prior to KEYW, Alissa performed digital forensic investigations and incident response for a large contractor in the Defense Industrial Base. Alissa began her career in information security as a Communications Officer in the United States Marine Corps and is a graduate of University of Virginia and University of Maryland. As an accomplished instructor, Alissa has taught for various government agencies on topics including digital forensics, incident response, and offensive methodologies, and is a frequent speaker at industry conferences. In addition to being a GIAC Certified Forensic Analyst (GCFA), she holds the GPEN, CISSP, EnCE, CFCE, MCT and CTT+.



## FOR610: Reverse-Engineering Malware: Malware Analysis Tools & Techniques

This popular malware analysis course has helped forensic investigators, malware specialists, incident responders, and IT administrators assess malware threats. The course teaches a practical approach to examining malicious programs—spyware, bots, trojans, etc.—that target or run on Microsoft Windows. This training also looks at reversing web-based malware, such as JavaScript and Flash files, as well as malicious document files. By the end of the course, you'll learn how to reverse-engineer malicious software using a variety of system and network monitoring utilities, a disassembler, a debugger, and other tools for turning malware inside-out!

The malware analysis process taught in this class helps incident responders assess the severity and repercussions of a situation that involves malicious software and plan recovery steps. Forensics investigators also learn how to understand key characteristics of malware discovered during the examination, including how to establish indicators of compromise (IOCs) for scoping and containing the incident.

### A Methodical Approach to Reverse-Engineering

The course begins by covering fundamental aspects of malware analysis. You'll learn how to set up an inexpensive and flexible laboratory for understanding the inner-workings of malicious software and will understand how to use the lab for exploring characteristics of real-world samples. Then you'll learn to examine the program's behavioral patterns and code. Afterwards, you'll experiment with reverse-engineering compiled Windows executables and Web browser malware.

The course continues by discussing essential x86 assembly language concepts. You'll examine malicious code to understand the program's key components and execution flow. Additionally, you'll learn to identify common malware characteristics by looking at Windows API patterns and will examine excerpts from bots, rootkits, keyloggers and downloaders. You'll understand how to work with PE headers and handle DLL interactions. Furthermore, you'll learn tools and techniques for bypassing anti-analysis capabilities of armored malware, experimenting with packed executables and obfuscated browser scripts.

Towards the end of the course, you'll learn to analyze malicious document files that take the form of Microsoft Office and Adobe PDF documents. Such documents act as a common infection vector and need to be understood by enterprises concerned about both large-scale and targeted attacks. The course also explores memory forensics approaches to examining rootkits. Memory-based analysis techniques also help understand the context of an incident involving malicious software.

### Hands-On Training for Malware Analysis and Reversing

Hands-on workshop exercises are a critical aspect of this course and allow you to apply reverse-engineering techniques by examining malware in a controlled environment. When performing the exercises, you'll study the supplied specimen's behavioral patterns and examine key portions of its code. You'll examine malware on a Windows virtual machine that you'll infect during the course and will use the supplied Linux virtual machine REMnux that includes tools for examining and interacting with malware.

### Complexity of the Course: Formalizing and Expanding Your Malware Analysis Skills

While the field of reverse-engineering malware is in itself advanced, the course begins by covering this topic from an introductory level and quickly progresses to discuss tools and techniques of intermediate complexity. Overall, the goal of the course is to act as a practical way for the motivated technologists to enter the field of malware analysis and reversing.

Neither programming experience nor the knowledge of assembly is required to benefit from the course. However, you should have a general idea about core programming concepts, such as variables, loops and functions. The course spends some time discussing essential aspects of Intel assembly to allow malware analysts to navigate through malicious executables using a debugger and a disassembler.

*"Lenny Zeltser is an outstanding instructor who cares about his students. His expertise combined with his teaching skills makes for an outstanding class."*

—RYAN KELLEY, DIEBOLD, INC.

*"This class gave me essential tools that I can immediately apply to protect my organization."*

—DON LOPEZ, VALLEY NATIONAL BANK

### Who Should Attend

- Professionals with responsibilities in the areas of incident response, forensic investigation, Windows security, and system administration
- Professionals who deal with incidents involving malware and would like to learn how to understand key aspects of malicious programs
- Individuals who attended the course have experimented with aspects of malware analysis prior to the course and were looking to formalize and expand their malware forensics expertise

### You Will Be Able To

- Build an isolated laboratory environment for analyzing code and behavior of malicious programs
- Employ network and system-monitoring tools to examine how malware interacts with the file system, the registry, the network and other processes on Microsoft Windows
- Uncover and analyze malicious JavaScript, VB Script and ActionScript components of web pages, which are often used as part of drive-by attacks
- Control some aspect of the malicious program's behavior through network traffic interception and code patching
- Use a disassembler and a debugger to examine inner-workings of malicious Windows executables
- Bypass a variety of defensive mechanisms designed by malware authors to misdirect, confuse and otherwise slow down the analyst
- Recognize and understand common assembly-level patterns in malicious code, such as DLL injection
- Assess the threat associated with malicious documents, such as PDF and Microsoft Office files in the context of targeted attacks
- Derive Indicators of Compromise (IOCs) from malicious executables to contain and recover from the incident
- Utilize practical memory forensics techniques to examine capabilities of rootkits



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## Course Day Descriptions

### 610.1 Hands On: Malware Analysis Fundamentals \*

Day one lays the groundwork for the course by presenting the key tools and techniques malware analysts use to examine malicious programs. You will learn how to save time by exploring malware in two phases. Behavioral analysis focuses on the specimen's interactions with its environment, such as the registry, the network, and the file system; code analysis focuses on the specimen's code and makes use of a disassembler and a debugger. You will learn how to build a flexible laboratory to perform such analysis in a controlled manner and will set up such a lab on your laptop. Also, we will jointly analyze a malware sample to reinforce the concepts and tools discussed throughout the day.

**Topics:** Configuring the malware analysis lab; Assembling the toolkit for malware forensics; Performing behavioral analysis of malicious Windows executables; Performing static and dynamic code analysis of malicious Windows executables; Additional learning resources for reverse-engineering malware

### 610.2 Hands On: Additional Malware Analysis Approaches \*

Day two builds upon the fundamentals introduced earlier in the course, and discusses techniques for uncovering additional aspects of the malicious program's functionality. You will learn about packers and the analysis approaches that may help bypass their defenses. You will also learn how to patch malicious executables to change their functionality during the analysis without recompiling them. You will also understand how to redirect network traffic in the lab to better interact with malware, such as bots and worms, to understand their capabilities. And you'll experiment with the essential tools and techniques for analyzing web-based malware, such as malicious browser scripts and Flash programs.

**Topics:** Reinforcing the dynamic analysis concepts learned in 610.1; Patching compiled malicious Windows executables; Analyzing packed malicious executable files; Intercepting network connections in the malware lab; Analyzing Web browser malware implemented in JavaScript and Flash

### 610.3 Hands On: Malicious Code Analysis \*

Day three focuses on examining malicious executables at the assembly level. You will discover approaches for studying inner-workings of a specimen by looking at it through a disassembler and, at times, with the help of a debugger. The day begins with an overview of key code reversing concepts and presents a primer on essential x86 assembly concepts, such as instructions, function calls, variables, and jumps. You will also learn how to examine common assembly constructs, such as functions, loops, and conditional statements. The second half of the day discusses how malware implements common characteristics, such as keylogging, packet spoofing, and DLL injection, at the assembly level. You will learn how to recognize such characteristics in malicious Windows executables.

**Topics:** Core concepts for reverse-engineering malware at the code level; x86 Intel assembly language primer; Handling anti-disassembling techniques; Identifying key x86 assembly logic structures with a disassembler; Patterns of common malware characteristics at the Windows API level (DLL injection, hooking, keylogging, sniffing, etc.)

### 610.4 Hands On: Self-Defending Malware \*

Day four begins by covering several techniques malware authors commonly employ to protect malicious software from being analyzed, often with the help of packers. You will learn how to bypass analysis defenses, such as structured error handling for execution flow, PE header corruption, fake memory breakpoints, tool detection, integrity checks, and timing controls. It's a lot of fun! As with the other topics covered throughout the course, you will be able to experiment with such techniques during hands-on exercises. The course completes by revising the topic of web-based malware, showing additional tools and approaches for analyzing more complex malicious scripts written in VBScript and JavaScript.

**Topics:** Identifying packers; Manual unpacking of packed and otherwise protected malicious Windows executables; Tips and tricks for bypassing anti-analysis mechanisms built into malware; Additional techniques for analyzing obfuscated browser scripts using tools such as SpiderMonkey

### 610.5 Hands On: Malicious Documents and Memory Forensics \*

Day five starts by exploring common patterns of assembly instructions often used to gain initial access to the victims computer. Next, we will learn how to analyze malicious Microsoft Office documents, covering tools such as OfficeMalScanner and explore steps for analyzing malicious PDF documents with utilities such as Origami and PDF Tools. Another major topic covered in this section is the reversing of malicious Windows executables using memory forensics techniques. We will explore this topic with the help of tools such as the Volatility Framework and associated plug-ins. The discussion of memory forensics will bring us deeper into the world of user and kernel-mode rootkits and allow us to use context of the infection to reverse-engineer malware more efficiently.

**Topics:** Analyzing malicious Microsoft Office (Word, Excel, PowerPoint) and Adobe PDF documents; Examining shellcode in the context of malicious files; Analyzing memory to assess malware characteristics and reconstruct infection artifacts; Using memory forensics to analyze rootkit infections

### 610.6 Hands On: Malware Reverse-Engineering Challenge \*

Day six assigns students to the role of a malware reverse engineer, working as a member of an incident response and malware analysis team. Students are presented with a variety of challenges involving real-world malware. These challenges validate students' ability to respond to typical malware reversing tasks in an instructor-led lab environment and offers additional learning opportunities. The challenges are designed to reinforce skills covered in the first five sections of the course, making use of the hugely popular SANS NetWars tournament platform. By applying the techniques learned earlier in the course, students solidify their knowledge and can shore up skill areas where they feel they need additional practice.

**Topics:** Behavioral Malware Analysis; Dynamic Malware Analysis (using a debugger); Static Malware Analysis (using a disassembler); JavaScript Deobfuscation; PDF Document Analysis; Office Document Analysis; Flash File Analysis; Memory Analysis

*\*This course is available to Forensics 610 participants only.*



**SANS Senior Instructor**  
**Lenny Zeltser**

Lenny Zeltser is a seasoned business leader with extensive experience in information technology and security. As a product management director at NCR Corporation, he focuses on safeguarding IT infrastructure of small and midsize businesses world-wide. Before NCR, Lenny led the enterprise security consulting practice at a major IT hosting provider. In addition, Lenny is a Board of Directors member at SANS Technology Institute and a volunteer incident handler at the Internet Storm Center. Lenny's expertise is strongest at the intersection of business, technology and information security practices and includes incident response, cloud services and product management. He frequently speaks at conferences, writes articles and has co-authored books on network security and malicious software defenses. Lenny is one of the few individuals in the world who've earned the prestigious GIAC Security Expert designation. He has an MBA degree from MIT Sloan and a Computer Science degree from the University of Pennsylvania. Lenny writes at [blog.zeltser.com](http://blog.zeltser.com) and [twitter.com/lennyzeltser](https://twitter.com/lennyzeltser). More details about his projects are at [www.zeltser.com](http://www.zeltser.com).



Six-Day Program | Mon, Sept 16 - Sat, Sept 21

9:00am - 7:00pm (Day 1) | 8:00am - 7:00pm (Days 2-5) | 8:00am - 5:00pm (Day 6)

46 CPE/CMU Credits | GIAC Cert: GISP | Instructor: Eric Conrad

## MGT414: SANS® +S™ Training Program for the CISSP® Certification Exam

The SANS® +S™ Training Program for the CISSP® Certification Exam will cover the security concepts needed to pass the CISSP® exam. This is an accelerated review course that assumes the student has a basic understanding of networks and operating systems and focuses solely on the 10 domains of knowledge of the CISSP®:

- Domain 1: Access Controls
- Domain 2: Telecommunications and Network Security
- Domain 3: Information Security Governance & Risk Management
- Domain 4: Software Development Security
- Domain 5: Cryptography
- Domain 6: Security Architecture and Design
- Domain 7: Security Operations
- Domain 8: Business Continuity and Disaster Recovery Planning
- Domain 9: Legal, Regulations, Investigations and Compliance
- Domain 10: Physical (Environmental) Security

Each domain of knowledge is dissected into its critical components. Every component is discussed in terms of its relationship to other components and other areas of network security. After completion of the course, the student will have a good working knowledge of the 10 domains of knowledge and, with proper preparation, be ready to take and pass the CISSP® exam.

### Obtaining your CISSP® certification consists of:

- Fulfilling minimum requirements for professional work experience
- Completing the Candidate Agreement
- Review of résumé
- Passing the CISSP® 250 multiple-choice question exam with a scaled score of 700 points or greater
- Submitting a properly completed and executed Endorsement Form
- Periodic Audit of CPEs to maintain the credential

**Note: CISSP®: exams are not hosted by SANS. You will need to make separate arrangements to take the CISSP® exam.**

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast. More info on page 70.

*"This course breaks the huge CISSP study books down into manageable chunks, and helped me focus and identify weaknesses. The instructor's knowledge and teaching skills are excellent."*

-JEFF JONES,

CONSTELLATION ENERGY GROUP



*"This class focuses like a laser on the key concepts you'll need to understand the CISSP exam. Don't struggle with thousand page textbooks – let this course be your guide!"*

-CARL WILLIAMS, HARRIS CORPORATION



www.giac.org

### Who Should Attend

- Security professionals who are interested in understanding the concepts covered in the CISSP® exam as determined by (ISC)²
- Managers who want to understand the critical areas of network security
- System, security, and network administrators who want to understand the pragmatic applications of the CISSP® 10 Domains
- Security professionals and managers looking for practical ways the 10 domains of knowledge can be applied to the current job
- In short, if you desire a CISSP® or your job requires it, MGT414 is the training for you to get GISP certified

### You Will Be Able To

- Understand the 10 domains of knowledge that are covered on the CISSP® exam
- Analyze questions on the exam and be able to select the correct answer
- Apply the knowledge and testing skills learned in class to pass the CISSP® exam
- Apply the skills learned across the 10 domains to solve security problems when you return back to work
- Understand and explain all of the concepts covered in the 10 domains of knowledge



### 414.1 Introduction and Access Control \*

Learn the specific requirements needed to obtain the CISSP® certification. General security principles needed in order to understand the 10 domains of knowledge are covered in detail with specific examples in each area. The first of 10 domains, Access Control which includes AAA (authentication, authorization, and accountability), using real-world scenarios will be covered with an emphasis on controlling access to critical systems.

**Topics:** Overview of Certification; Description of the 10 Domains: Introductory Material;  
Domain 1: Access Controls

### 414.2 Telecommunications and Network Security \*

Understanding network communications is critical to building a solid foundation for network security. All aspects of network security will be examined including routing, switches, key protocols, and how they can be properly protected on the network. The telecommunications domain covers all aspects of communication and what is required to provide an infrastructure that has embedded security.

**Topics:** Domain 2: Telecommunications and Network Security

### 414.3 Information Security Governance & Risk Management and Software Development Security \*

In order to secure an organization, it is important to understand the critical components of network security and issues that are needed in order to manage security in an enterprise. Security is all about mitigating risk to an organization. The core areas and methods of calculating risk will be discussed. In order to secure an application it is important to understand system engineering principles and techniques. Software development life cycles are examined, including examples of what types of projects are suited for different life cycles.

**Topics:** Domain 3: Information Security Governance & Risk Management;  
Domain 4: Software Development Security

### 414.4 Cryptography and Security Architecture & Design \*

Cryptography plays a critical role in the protection of information. Examples showing the correct and incorrect ways to deploy cryptography, and common mistakes made, will be presented. The three types of crypto systems are examined to show how they work together to accomplish the goals of crypto. A computer consists of both hardware and software. Understanding the components of the hardware, how they interoperate with each other and the software, is critical in order to implement proper security measures. We examine the different hardware components and how they interact to make a functioning computer.

**Topics:** Domain 5: Cryptography; Domain 6: Security Architecture and Design

### 414.5 Security Operations and Business Continuity & Disaster Recovery Planning \*

Non-technical aspects of security are just as critical as technical aspects. Security operations security focuses on the legal and managerial aspects of security and covers components such as background checks and non-disclosure agreements, which can eliminate problems from occurring down the road. Business continuity planning is examined, comparing the differences between BCP and DRP. A life cycle model for BCP/DRP is covered giving scenarios of how each step should be developed.

**Topics:** Domain 7: Security Operations; Domain 8: Business Continuity and Disaster Recovery Planning

### 414.6 Legal, Regulations, Investigations and Compliance & Physical (Environmental) Security \*

If you work in network security, understanding the law is critical during incident responses and investigations. The common types of laws are examined, showing how critical ethics are during any type of investigation. If you do not have proper physical security, it doesn't matter how good your network security is; someone can still obtain access to sensitive information. In this section various aspects and controls of physical security are discussed.

**Topics:** Domain 9: Legal, Regulations, Investigations and Compliance; Domain 10: Physical (Environmental) Security

*\*This course is available to Management 414 participants only.*



**SANS Certified Instructor**  
**Eric Conrad**

Eric Conrad is lead author of the book *The CISSP Study Guide*. Eric's career began in 1991 as a UNIX systems administrator for a small oceanographic communications company. He gained information security experience in a variety of industries, including research, education, power, Internet, and health care. He is now president of Backshore Communications, a company focusing on intrusion detection, incident handling, information warfare, and penetration testing. He is a graduate of the SANS Technology Institute with a master of science degree in information security engineering. In addition to the CISSP, he holds the prestigious GIAC Security Expert (GSE) certification as well as the GIAC GPEN, GCIH, GCIA, GCFA, GAWN, and GSEC certifications. Eric also blogs about information security at [www.ericconrad.com](http://www.ericconrad.com).

*"The course covers a great deal of government and industry-specific content that is necessary for passing the CISSP."*

-ROB OATMAN,

U.S. COAST GUARD ACADEMY

## MGT512: SANS Security Leadership Essentials For Managers with Knowledge Compression™

This completely updated course is designed to empower advancing managers who want to get up to speed quickly on information security issues and terminology. You won't just learn about security, you will learn how to manage security. Lecture sections are intense; the most common student comment is that it's like drinking from a fire hose. The diligent manager will learn vital, up-to-date knowledge and skills required to supervise the security component of any information technology project. Additionally, the course has been engineered to incorporate the NIST Special Publication 800 (series) guidance so that it can be particularly useful to U.S. government managers and supporting contractors.

Essential security topics covered in this management track include: network fundamentals and applications, power, cooling and safety, architectural approaches to defense in depth, cyber attacks, vulnerability assessment and management, security policies, contingency and continuity planning, awareness management, risk management analysis, incident handling, web application security, and offensive and defensive information warfare, culminating with our management practicum. The material uses Knowledge Compression™, special charts, and other proprietary SANS techniques to help convey the key points of critical slides and keep the information flow rate at a pace senior executives demand every teaching hour of the course. The course has been evaluated and approved by CompTIA's CAQC program for Security+ 2008 to ensure that managers and their direct reports have a common baseline for security terminology and concepts. You will be able to put what you learn into practice the day you get back into the office.

*"Every IT security professional should attend no matter what their position. This information is important to everyone."*

-JOHN FLOOD, NASA

### Knowledge Compression™

#### Maximize your learning potential!

Knowledge Compression™ is an optional add-on feature to a SANS class which aims to maximize the absorption and long-term retention of large amounts of data over a relatively short period of time. Through the use of specialized training materials, in-class reviews, examinations and test-taking instruction, Knowledge Compression™ ensures students have a solid understanding of the information presented to them. By attending classes that feature this advanced training product, you will experience some of the most intense and rewarding training programs SANS has to offer, in ways that you never thought possible!

*"Extremely relevant! Presented in a high energy, very interesting style. MGT512 is a great source of reference material."*

-LARRY BELL, VERIZON WIRELESS



### Who Should Attend

- All newly appointed information security officers
- Technically skilled administrators who have recently been given leadership responsibilities
- Seasoned managers who want to understand what your technical people are telling you

### You Will Be Able To

- Establish a minimum standard for IT security knowledge, skills, and abilities. In a nutshell, this course covers all of the non-operating system topics that are in SANS Security Essentials, though not to the same depth. The goal is to enable managers and auditors to speak the same language as system, security, and network administrators.
- Establish a minimum standard for IT management knowledge, skills, and abilities. I keep running into managers who don't know TCP/IP, and that is OK; but then they don't know how to calculate total cost of ownership (TCO), leaving me quietly wondering what they do know.
- Save the up-and-coming generation of senior and rapidly advancing managers a world of pain by sharing the things we wish someone had shared with us. As the saying goes, it is OK to make mistakes, just make new ones.

*"Gives a good understanding of what knowledge our employees need to have to be successful."*

-TEDDIE STEELE, STATE DEPARTMENT OF FCU



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### 512.1 Managing the Enterprise, Planning, Network, and Physical Plant\*

The course starts with a whirlwind tour of the information an effective IT security manager must know to function in today's environment. We will cover safety, physical security, and how networks and the related protocols, like TCP/IP, work and equip you to review network designs for performance, security, vulnerability scanning, and return on investment. You will learn more about secure IT operations in a single day than you ever thought possible.

**Topics:** Budget Awareness and Project Management; The Network Infrastructure; Computer and Network Addressing; IP Terminology and Concepts; Vulnerability Management; Managing Physical Safety, Security & the Procurement Process

### 512.2 IP Concepts, Attacks Against the Enterprise, and Defense-in-Depth\*

Learn information assurance foundations, which are presented in the context of both current and historical computer security threats, and how they have impacted confidentiality, integrity, and availability. You will learn the methods of attack and the importance of managing attack surface.

**Topics:** Attacks Against the Enterprise; Defense in Depth; Managing Security Policy; Access Control and Password Management

### 512.3 Secure Communications\*

Examine various cryptographic tools and technologies and how they can be used to secure a company's assets. A related area called steganography, or information hiding, is also covered. Learn how malware and viruses often employ cryptographic techniques in an attempt to evade detection. We will learn about managing privacy issues in communications and investigate web application security.

**Topics:** Cryptography; Wireless Network Security; Steganography; Managing Privacy; Web Communications and Security; Operations Security, Defensive and Offensive Methods

### 512.4 The Value of Information\*

On this day we consider the most valuable resource an organization has: its information. You will learn about intellectual property, incident handling, and to identify and better protect the information that is the real value of your organization. We will then formally consider how to apply everything we have learned, as well as practice briefing management on our risk architecture.

**Topics:** Managing Intellectual Property; Incident Handling Foundations; Information Warfare; Disaster Recovery/Contingency Planning; Managing Ethics; IT Risk Management

### 512.5 Management Practicum\*

On the fifth and final day, we pull it all together and apply the technical knowledge to the art of management. The management practicum covers a number of specific applications and topics concerning information security. We'll explore proven techniques for successful and effective management, empowering you to immediately apply what you have learned your first day back at the office.

**Topics:** The Mission; Globalization; IT Business and Program Growth; Security and Organizational Structure; The Total Cost of Ownership; Negotiations; Fraud; Legal Liability; Technical People

*\*This course is available to Management 512 participants only.*

**Security Leaders and Managers** earn the highest salaries (well over six figures) in information security and are near the top of IT. Needless to say, to work at that compensation level, excellence is demanded. These days, security managers are expected to have domain expertise as well as the classic project management, risk assessment, and policy review and development skills.



**SANS Certified Instructor**

**G. Mark Hardy**

G. Mark Hardy is founder and President of National Security Corporation. He has been providing cyber security expertise to government, military, and commercial clients for over 30 years, and is an internationally recognized expert who has spoken at over 250 events world-wide. Hardy serves on the Advisory Board of CyberWATCH, an Information Assurance/Information Security Advanced Technology Education Center of the National Science Foundation. A retired U.S. Navy Captain, he was privileged to serve in command nine times, including responsibility for leadership training for 70,000 Sailors. He also served as war-time Director, Joint Operations Center for US Pacific Command, and Assistant Director of Technology and Information Management for Naval Logistics in the Pentagon, with responsibility for INFOSEC, Public Key Infrastructure, and Internet security. Captain Hardy was awarded the Defense Superior Service Medal, the Legion of Merit, five Meritorious Service Medals, and 24 other medals and decorations. A graduate of Northwestern University, he holds a BS in Computer Science, a BA in Mathematics, a Masters in Business Administration, a Masters in Strategic Studies, and holds the GSLC, CISSP, CISM and CISA certifications.

## MGT514: IT Security Strategic Planning, Policy and Leadership

### *Mastering the Strategic Planning Process*

Strategic planning is hard for people in IT and IT Security because we spend so much time responding and reacting. Some of us have been exposed to a SWOT or something similar in an MBA course, but we almost never get to practice until we get promoted to a senior position, and then we are not equipped with the skills we need to run with the pack.

In this course you will learn the entire strategic planning process: what it is and how to do it; what lends itself to virtual teams; and what needs to be done face to face. We will practice building those skills in class. Topics covered in depth include how to “plan the plan,” horizon analysis, visioning, environmental scans (SWOT, PEST, Porter’s etc.), historical analysis, mission, vision, and value statements. We will also discuss the planning process core, candidate initiatives, the prioritization process, resource and IT change management in planning, how to build the roadmap, setting up assessments, and revising the plan.

We will see examples and hear stories from businesses, especially IT and security oriented businesses, and then work together on labs. Business needs change, the environment changes, new risks are always on the horizon, and critical systems are continually exposed to new vulnerabilities. Strategic planning is a never-ending process. The planning section is hands-on and there is exercise-intensive work on writing, implementing, and assessing strategic plans.

### *Creating Effective Information Security Policy*

Policy is a manager’s opportunity to express expectations for the workforce, to set the boundaries of acceptable behavior and empower people to do what they ought to be doing. It is easy to get wrong. Have you ever seen a policy and your response was, “No way, I am not going to do that?” Policy must be aligned with an organization’s culture. We will break down the steps to policy development so that you have the ability to develop and assess policy successfully.

### *Developing Management and Leadership Skills*

The third focus of the course is on management and leadership competencies. Leadership is a capability that must be learned, exercised and developed to better ensure organizational success. Strong leadership is brought about primarily through selfless devotion to the organization and staff, tireless effort in setting the example, and the vision to see and effectively use available resources toward the end goal. However, leaders and followers influence each other toward the goal; it is a two-way street where all parties perform their functions to reach a common objective.

Effective leadership entails persuading team members to accomplish their objectives while removing obstacles and maintaining the well-being of the team in support of the organization’s mission. Grooming effective leaders is critical to all types of organizations, as the most effective teams are cohesive units that work together toward common goals with camaraderie and a can-do spirit!

Leadership tends to be a bit “squishy” and courses covering the topic are often based upon the opinions of people who were successful in the marketplace. However, success can be as much a factor of luck as skill, so we base this part of the course on five decades of the research of social scientists and their experiments going as far back as Maslow and on research as current as Sunstein and Thaler. We discuss leadership skills that apply to commercial business, non-profit, not-for-profit, or other organizations. This course is designed to develop existing and new supervisors and managers who aspire to go beyond being the boss. It will help you build leadership skills to enhance the organization’s climate and team-building skills to support the organization’s mission, its growth in productivity, workplace attitude/satisfaction, and staff and customer relationships.



[www.sans.edu](http://www.sans.edu)

### Who Should Attend

This course is designed and taught for existing, recently appointed, and aspiring IT and IT security managers and supervisors who desire to enhance their leadership and governance skills to develop their staff into a more productive and cohesive team.

### You Will Be Able To

- Calculate the half life of information
- Establish a strategic planning horizon appropriate for your organization
- Conduct any of the well known environmental scans (SWOT, Porters 5, Pest and many others)
- Facilitate out of the box thinking (brainstorming, reverse brainstorming, synergetics)
- Select between candidate initiatives and preform back of the envelope planning
- Understand how policy is used and when it is needed or not needed
- Manage the policy creation process
- Develop policy for difficult topics such as social media
- Evaluate policy using using the SMART methodology
- Understand the use of leadership competencies in developing leadership skills
- Select a few competencies to work on to further your effectiveness



### 514.1 An Approach to Strategic Planning \*

Our approach to strategic planning is that there are activities that can be done virtually in advance of a retreat, and then other activities are best done in a retreat setting. On the first day, we will talk about some of the activities that can be done virtually.

**Topics:** How to plan the plan; Historical analysis; Horizon analysis; Visioning; Environmental scans (SWOT, PEST, Porters etc.); Mission, vision, and value statements

### 514.2 Planning To Ensure Institutional Effectiveness \*

This will include the retreat section of the course where we do the core planning activities of candidate selection, prioritization, and development of the roadmap.

### 514.3 Security Policy Development \*

You will experience the most in-depth coverage of security policy ever developed. By the end of the course your head will be spinning. Students and other SANS instructors who have seen the scope of the material have the same comment, "I never realized there is so much to know about security policy." Any security manager, anyone assigned to review, write, assess or support security policy and procedure, can benefit from this section. You will learn what policy is, positive and negative tone, consistency of policy bullets, how to balance the level of specificity to the problem at hand, the role of policy, awareness and training, and the SMART approach to policy development and assessment. We cover different levels of policy from Information Security Management System (ISMS) governing policy to detailed issue-specific policies like acceptable use, approved encryption and end of life disposal of IT assets.

**Topics:** Policy establishes bounds for behavior; Policy empowers users to do the right thing; Should and shall, guidelines and policy; ISMS as governing policy; Policy versus procedure; Policy needs assessment process; Organizational Assumptions, Beliefs and Values (ABVs); Relationship of mission statement to policy; Organizational culture

### 514.4 Comprehensive Security Policy Assessment \*

In the policy section of the course, you will be exposed to over 100 different policies through an instructional delivery methodology that balances lecture, labs, and in-class discussion. We will emphasize techniques to create successful policy that users will read and follow; policy that will be accepted by the business units because it is sensitive to the organizational culture; and policy that uses the psychology of information security to guide implementation.

**Topics:** Using the principles of psychology to implement policy; Applying the SMART Method to policy; How policy protects people, organizations and information; Case study, the process to handle a new risk (Sexting); Policy header components and how to use them; Issue-specific policies; Behavior related policies, acceptable use, ethics; Warning banners; Policy development process; Policy review and assessment process; Wrap-up, the six golden nuggets of policy

### 514.5 Leadership and Management Competencies \*

Essential leadership topics covered here include: leadership development, coaching and training, employee involvement, conflict resolution, change management, vision development, motivation, communication skills, self-direction, brainstorming techniques, benefits, and the ten core leadership competencies. In a nutshell, you'll learn the critical processes that should be employed to develop the skills and techniques to select, train, equip, and develop a team into a single cohesive unit with defined roles that operate together in harmony toward team-objective accomplishment.

**Topics:** Leadership building blocks; Coaching & training; Change management; Team development; Motivating; Developing the vision; Leadership development; Building competencies; Importance of communication; Self-direction; Brainstorming; Relationship building; Teamwork concepts; Leader qualities; Leadership benefits

*\*This course is available to Management 514 participants only.*



SANS Faculty Fellow

### Stephen Northcutt

Stephen Northcutt founded the GIAC certification and served as president of the SANS Technology Institute. Stephen is author/coauthor of *Incident Handling Step-by-Step*, *Intrusion Signatures and Analysis*, *Inside Network Perimeter Security* 2nd Edition, *IT Ethics Handbook*, *SANS Security Essentials*, *SANS Security Leadership Essentials*, and *Network Intrusion Detection* 3rd Edition. He was the original author of the Shadow Intrusion Detection system before accepting the position of chief for information warfare at the Ballistic Missile Defense Organization. Stephen is a graduate of Mary Washington College. Before entering the field of computer security, he worked as a Navy helicopter search and rescue crewman, white water raft guide, chef, martial arts instructor, cartographer, and network designer.

Since 2007 Stephen has conducted over 40 in-depth interviews with leaders in the security industry, from CEOs of security product companies to the most well-known practitioners, in order to research the competencies required to be a successful leader in the security field. He maintains the SANS Leadership Laboratory, where research on these competencies is posted, as well as SANS Security Musings. He leads the Management 512 Alumni Forum, where hundreds of security managers post questions. He is the lead author/instructor for Management 512: SANS Security Leadership Essentials for Managers, a prep course for the GSLC certification that meets all levels of requirements for DoD Security Managers per DoD 8570. He also is the lead author/instructor for Management 514: IT Security Strategic Planning, Policy, and Leadership. Stephen blogs at the SANS Security Laboratory. [www.sans.edu/research/leadership-laboratory](http://www.sans.edu/research/leadership-laboratory)



## MGT525: IT Project Management, Effective Communication, and PMP® Exam Prep

With updated course contents to help you prepare for the updated 2013 PMP® Exam, **MGT525: IT Project Management, Effective Communication, and PMP® Exam Prep** is a PMI Registered Education Provider (R.E.P.). R.E.P.s provide the training necessary to earn and maintain the Project Management Professional (PMP®) and other professional credentials. This course has been recently updated to fully prepare you for the updated 2013 PMP® exam changes. During this class you will learn how to improve your project planning methodology and project task scheduling to get the most out of your critical IT resources. We will utilize project case studies that highlight information technology services as deliverables. MGT525 follows the basic project management structure from the *PMBOK® Guide* (Fifth Edition) and also provides specific techniques for success with information assurance initiatives. Throughout the week, we will cover all aspects of IT project management – from initiating and planning projects through managing cost, time, and quality while your project is active, to completing, closing, and documenting as your project finishes. A copy of the *PMBOK® Guide* is provided to all participants. You can reference the *PMBOK® Guide* and use your course material along with the knowledge you gain in class to prepare for the Project Management Professional (PMP®) Exam and the GIAC Certified Project Manager Exam.

The project management process is broken down into core process groups that can be applied across multiple areas of any project, in any industry. Although our primary focus is the application to the InfoSec industry, our approach is transferable to any projects that create and maintain services as well as general product development. We cover in-depth how cost, time, quality, and risks affect the services we provide to others. We will also address practical human resource management as well as effective communication and conflict resolution. You will learn specific tools to bridge the communications gap between managers and technical staff.

*“Within the first five minutes I knew this would be a very different (and welcomed) experience than prior training with other vendors. SANS’ attention to detail is evident in every slide.”*

—JAYME JORDAN, RAYTHEON

*“I think this is an awesome course that provides the knowledge and tools that I can use right when I get back to work.”*

—JOHNNY MATAMOROS JR, FREEMAN

*“Jeff is very knowledgeable – he brings real-life examples which help explain material. Material is set up perfectly.”*

—MARIA SAGGIOMO, DLA INFORMATION OPERATIONS PHILADELPHIA



### Who Should Attend

- Individuals interested in preparing for the Project Management Professional (PMP®) Exam
- Security professionals who are interested in understanding the concepts of IT project management
- Managers who want to understand the critical areas of making projects successful
- Individuals working with time, cost, quality, and risk sensitive projects and applications
- Anyone who would like to utilize effective communication techniques and proven methods to relate better to people
- Anyone in a key or lead engineering/design position who works regularly with project management staff

### You Will Be Able To

- Recognize the top failure mechanisms related to IT and infosec projects, so that your projects can avoid common pitfalls
- Create a project charter which defines the project sponsor and stakeholder involvement
- Document project requirements and create a requirements traceability matrix to track changes throughout the project lifecycle
- Clearly define the scope of a project in terms of cost, schedule and technical deliverables
- Create a work breakdown structure defining work packages, project deliverables and acceptance criteria
- Develop a detailed project schedule, including critical path tasks and milestones
- Develop a detailed project budget including cost baselines and tracking mechanisms
- Develop planned and earned value metrics for your project deliverables and automate reporting functions
- Effectively manage conflict situations and build communication skills with your project team
- Document project risks in terms of probability and impact, assign triggers and risk response responsibilities
- Create project earned value baselines and project schedule and cost forecasts



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### 525.1 Project Management Structure & Framework \*

This course offers insight and specific techniques that both beginner and experienced project managers can utilize. The structure and framework section lays out the basic architecture and organization of project management. We will cover the common project management group processes, the difference between projects and operations, project life cycles, and managing project stakeholders.

**Topics:** Definition of Terms and Process Concepts; Group Processes; Project Life Cycle; Types of Organizations; PDCA Cycle

### 525.2 Project Charter and Scope Management \*

During day two, we will go over techniques used to develop the project charter and formally initiate a project. The scope portion defines the important input parameters of project management and gives you the tools to ensure that from the onset your project is well defined. We cover tools and techniques that will help you define your project's deliverables and develop milestones to gauge performance and manage change requests.

**Topics:** Formally Initiating Projects; Project Charters; Project Scope Development; Work Breakdown Structures; Scope Verification and Control

### 525.3 Time and Cost Management \*

Our third day details the time and cost aspects of managing a project. We will cover the importance of correctly defining project activities, project activity sequence, and resource constraints. We will use milestones to set project timelines and task dependencies along with learning methods of resource allocation and scheduling. We introduce the difference between resource and product-related costs and go into detail on estimating, budgeting, and controlling costs. You will learn techniques for estimating project cost and rates as well as budgeting and the process for developing a project cost baseline.

**Topics:** Process Flow; Task Lead and Lag Dependencies; Resource Breakdown Structures; Task Duration Estimating; Critical Path Scheduling; Cost Estimating Tools; Cost vs. Quality; Cost Base Lining; Earned Value Analysis and Forecasting

### 525.4 Communications and Human Resources \*

During day four, we move into human resource management and building effective communications skills. People are the most valuable asset of any project and we cover methods for identifying, acquiring, developing and managing your project team. Performance appraisal tools are offered as well as conflict management techniques. You will learn management methods to help keep people motivated and provide great leadership. The effective communication portion of the day covers identifying and developing key interpersonal skills. We cover organizational communication and the different levels of communication as well as common communication barriers and tools to overcome these barriers.

**Topics:** Acquiring and Developing Your Project Team; Organizational Dependencies and Charts; Roles and Responsibilities; Team Building; Conflict Management; Interpersonal Communication Skills; Communication Models and Effective Listening

On day five you will become familiar with quality planning, quality assurance, and quality control methodologies as well as learning the cost of quality concept and its parameters. We define quality metrics and cover tools for establishing and benchmarking quality control programs. We go into quality assurance and auditing as well as using and understanding quality control charts. The risk section goes over known versus unknown risks and how to identify, assess, and categorize risk. We use quantitative risk analysis and modeling techniques so that you can fully understand how specific risks affect your project. You will learn ways to plan for and mitigate risk by reducing your exposure as well as how to take advantage of risks that could have a positive effect on your project.

**Topics:** Cost of Quality; Quality Metrics; Continual Process Improvement; Quality Baselines; Quality Control; Change Control; Risk Identification; Risk Assessment; Time and Cost Risks; Risk Probability and Impact Matrices; Risk Modeling and Response

### 525.6 Procurement and Project Integration \*

We close out the week with the procurement aspects of project management and then integrate all of the concepts presented into a solid, broad-reaching approach. We cover contract basics and different types of contracts and then the make-versus-buy decision process. We go over ways to initiate strong request for quotations (RFQ) and develop evaluation criteria, then qualify and select the best partners for your project. The final session integrates everything we have learned by bringing all the topics together with the common process groups. Using detailed project management methodology, we learn how to finalize the project management plan and then execute and monitor the progress of your project to ensure success.

**Topics:** Contract Types; Make vs. Buy Analysis; Vendor Weighting Systems; Contract Negotiations; Project Execution; Monitoring Your Projects Progress; Finalizing Deliverables; Forecasting and Integrated Change Control

*\*This course is available to Management 525 participants only.*



**SANS Certified Instructor**  
**Jeff Frisk**

Jeff Frisk currently serves as the director of the GIAC certification program and is a member of the STI Curriculum Committee. Jeff holds the PMP certification from the Project Management Institute and GIAC GSEC credentials. He also is a certified SANS instructor and course author for MGT525. He has worked on many projects for SANS and GIAC, including courseware, certification, and exam development. Jeff has an engineering degree from The Rochester Institute of Technology and more than 15 years of IT project management experience with computer systems, high tech consumer products, and business development initiatives. Jeff has held various positions including managing operations, product development, and electronic systems/computer engineering. He has many years of international and high-tech business experience working with both big and small companies to develop computer hardware/software products and services.

*"Jeff is a great teacher and delivers the content in a concise and focused manner."*

—EIRIKUR RÁFNSSON,

SPECIAL PROSECUTORS OFFICE

## AUD507: Auditing Networks, Perimeters, and Systems

One of the most significant obstacles facing many auditors today is how exactly to go about auditing the security of an enterprise. What systems really matter? How should the firewall and routers be configured? What settings should be checked on the various systems under scrutiny? Is there a set of processes that can be put into place to allow an auditor to focus on the business processes rather than the security settings? All of these questions and more will be answered by the material covered in this course.

This course is organized specifically to provide a risk-driven method for tackling the enormous task of designing an enterprise security validation program. After covering a variety of high-level audit issues and general audit best practices, the students will have the opportunity to dive deep into the technical how-to for determining the key controls that can be used to provide a level of assurance to an organization. Tips on how to repeatedly verify these controls and techniques for automatic compliance validation will be given from real-world examples.

One of the struggles that IT auditors face today is assisting management to understand the relationship between the technical controls and the risks to the business that these affect. In this course these threats and vulnerabilities are explained based on validated information from real-world situations. The instructor will take the time to explain how this can be used to raise the awareness of management and others within the organization to build an understanding of why these controls specifically and auditing in general are important. From these threats and vulnerabilities, we will explain how to build the ongoing compliance monitoring systems and how to automatically validate defenses through instrumentation and automation of audit checklists.

You'll be able to use what you learn immediately. Five of the six days in the course will either produce or provide you directly with a general checklist that can be customized for your audit practice. Each of these days includes hands-on exercises with a variety of tools discussed during the lecture sections so that you will leave knowing how to verify each and every control described in the class. Each of the five hands-on days gives you the chance to perform a thorough technical audit of the technology being considered by applying the checklists provided in class to sample audit problems in a virtualized environment. Each student is invited to bring a Windows XP Professional or higher laptop for use during class. Macintosh computers running OS X may also be used with VMWare Fusion.

A great audit is more than marks on a checklist; it is the understanding of what the underlying controls are, what the best practices are, and why. Sign up for this course and experience the mix of theoretical, hands-on, and practical knowledge.



*"By far, this is the most hands-on, technical tool-oriented auditing class I have ever seen. I cannot imagine another class that forces you to use real tools in real situations. It is just like gaining real world experience."*

-JAY RUSSELL, U.S. NAVY

*"This course is full of relevant, timely, current content, delivered in a highly engaging style. This course is a must for IT auditors and security specialists."*

-BROOKS ADAMS,

GEORGIA SOUTHERN UNIVERSITY

### Who Should Attend

- Auditors seeking to identify key controls in IT systems
- Audit professionals looking for technical details on auditing
- Managers responsible for overseeing the work of an audit or security team
- Security professionals newly tasked with audit responsibilities
- System and network administrators looking to better understand what an auditor is trying to achieve, how they think, and how to better prepare for an audit
- System and network administrators seeking to create strong change control management and detection systems for the enterprise

### You Will Be Able To

- Understand the different types of controls (e.g., technical vs. non-technical) essential to performing a successful audit
- Conduct a proper network risk assessment to identify vulnerabilities and prioritize what will be audited
- Establish a well-secured baseline for computers and networks—a standard to conduct an audit against
- Perform a network and perimeter audit using a seven-step process
- Audit firewalls to validate that rules/settings are working as designed, blocking traffic as required
- Utilize vulnerability assessment tools effectively to provide management with the continuous remediation information necessary to make informed decisions about risk and resources.
- Audit web application's configuration, authentication, and session management to identify vulnerabilities attackers can exploit
- Utilize scripting to build a system to baseline and automatically audit Active Directory and all systems in a Windows domain



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## LEG523: Law of Data Security & Investigations

New laws on privacy, e-discovery, and data security are creating an urgent need for professionals who can bridge the gap between the legal department and the IT department. The needed professional training is uniquely available in SANS' LEG523 series of courses, including skills in the analysis and use of contracts, policies, and records management procedures.

GIAC certification under LEG523 demonstrates to employers that a professional has not only attended classes, but studied and absorbed the sophisticated content of these courses. Certification distinguishes any professional, whether an IT expert, an auditor, a paralegal, or a lawyer, and the value of certification will grow in the years to come as law and security issues become even more interlocked.

This course covers the law of business, contracts, fraud, crime, IT security, IT liability and IT policy — all with a focus on electronically stored and transmitted records. The course also teaches investigators how to prepare credible, defensible reports, whether for cyber, forensics, incident response, human resources or other investigations.

### Day 1: Fundamentals of IT Security Law and Policy

### Day 2: E-Records, E-Discovery and Business Law

### Day 3: Contracting for Data Security & Other Technology

### Day 4: The Law of IT Compliance: How to Conduct Investigations

- Lessons from day 4 will be invaluable to the effective and credible execution of any kind of investigation — internal, government, consultant, security incidents, and the like. These lessons integrate with other tips on investigations introduced in other days of the LEGAL 523 course series.

### Day 5: Applying Law to Emerging Dangers: Cyber Defense

- In-depth review of legal response to the major security breach at TJX.
- Learn how to incorporate effective public communications into your cyber security program.

These five days of integrated education — where each successive day builds upon lessons from the earlier day(s) — will help any enterprise (public or private sector) cope with such problems as hackers, botnets, malware, phishing, unruly vendors, data leakage, industrial spies, rogue or uncooperative employees and bad publicity connected with IT security.

Recent updates to the courses address hot topics such as risk, investigations and business records retention connected with cloud computing and social networks like Facebook and Twitter. Updates also teach students how to analyze and respond to the risks and opportunities surrounding OSINT (open source intelligence gathering).

This course adopts an increasingly global perspective. Non-US professionals attend the Legal 523 course because there is no training like it anywhere else in the world. A lawyer from a European police agency recently attended and expressed high praise for the course when it was over. Although as a US attorney Mr. Wright does not know every law in the world, students like this European lawyer help him improve the course and include more non-US content each time he teaches it.

The Legal 523 course is complementary to SANS' rigorous digital forensics program. Together, Legal 523 and the SANS' digital forensics program provide professional investigators an unparalleled suite of training resources.

Legal 523 is tied to the coveted GLEG certification. GLEG can help a forensics investigator appear more credible as a witness in court, and help a forensics consultant win more business.

*"Its applicability to real-life cases depicts the practicality of the course."*

-SAMSON OKOCHA, NATIONAL  
IDENTITY MANAGEMENT COMMISSION



### Who Should Attend

- Investigators
- Security and IT professionals
- Lawyers
- Paralegals
- Auditors
- Accountants
- Technology Managers
- Vendors
- Compliance officers
- Law enforcement
- Privacy Officers
- Penetration Testers

*"This course was an eye-opener to the various legal issues in data security. Practices I will use when back in office."*

-ALBERTUS WILSON, SAUDI ARAMCO

*"Legal 523 is a great course to help the IT professional become aware of various laws, and the implications of the changing trends in cyber defense."*

-BETTY LAMBUTH, INFO TECH SOLUTIONS & SECURITY



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## DEV522: Defending Web Applications Security Essentials

***This is the course to take if you have to defend web applications!***

Traditional network defenses, such as firewalls, fail to secure web applications. The quantity and importance of data entrusted to web applications is growing, and defenders need to learn how to secure it. DEV522 covers the OWASP Top 10 and will help you to better understand web application vulnerabilities, thus enabling you to properly defend your organization's web assets.

Mitigation strategies from an infrastructure, architecture, and coding perspective will be discussed alongside real-world implementations that really work. The testing aspect of vulnerabilities will also be covered so you can ensure your application is tested for the vulnerabilities discussed in class.

To maximize the benefit for a wider range of audiences, the discussions in this course will be programming language agnostic. Focus will be maintained on security strategies rather than coding level implementation.

**DEV522: Defending Web Applications Security Essentials** is intended for anyone tasked with implementing, managing, or protecting Web applications. It is particularly well suited to application security analysts, developers, application architects, pen testers, and auditors who are interested in recommending proper mitigations to web security issues and infrastructure security professionals who have an interest in better defending their web applications.

The course will cover the topics outlined by OWASP's Top 10 risks document as well as additional issues the authors found of importance in their day-to-day web application development practice. The topics that will be covered include:

- Infrastructure Security
- Server Configuration
- Authentication mechanisms
- Application language configuration
- Application coding errors like SQL Injection and Cross-Site Scripting
- Cross-Site Request Forging
- Authentication Bypass
- Web services and related flaws
- Web 2.0 and its use of web services
- XPATH and XQUERY languages and injection
- Business logic flaws
- Protective HTTP Headers

The course will make heavy use of hands-on exercises. It will conclude with a large defensive exercise, reinforcing the lessons learned throughout the week.

***"What you don't know about web app defense is most likely killing you and you wouldn't know it."***

-MICHAEL MALARKEY,  
BANK OF AMERICA

***"This course really proved to me that ignorance is bliss. I learned a lot that I could immediately take back to the office."***

-SHAWN SHIRLEY, FERRUM COLLEGE

***"Not only does DEV522 teach the defenses for securing web apps, it also shows how common and easy the attacks are, thus the need to secure the apps."***

-BRANDON HARDIN, ITC

### Who Should Attend

- Application developers
- Application security analysts or managers
- Application architects
- Penetration testers who are interested in learning about defensive strategies
- Security professionals who are interested in learning about web application security
- Auditors who need to understand defensive mechanisms in web applications
- Employees of PCI compliant organizations who need to be trained to comply with PCI requirements

***"This is the class every web app developer should take to open their eyes to web security."***

-MASATOMO NOBORIKAWA,

UNIVERSITY OF NORTHERN IOWA



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## DEVELOPER 541

Four-Day Program | Mon, Sept 16 - Thu, Sept 19 | 9:00am - 5:00pm

24 CPE/CMU Credits | Laptop Required | GIAC Cert: GSSP-JAVA | Instructor: Srinidhi Mallur and Gregory Leonard

DEV541: **Secure Coding in Java/JEE: Developing Defensible Applications**

Great programmers have traditionally distinguished themselves by the elegance, effectiveness, and reliability of their code. That's still true, but those qualities have now been joined by security. Major financial institutions and government agencies have informed their internal development teams and outsourcers that programmers must demonstrate mastery of secure coding skills and knowledge through reliable third-party testing or lose their right to work on assignments for those organizations. More software buyers are joining the movement every week.

Such buyer and management demands create an immediate response from programmers, "Where can I learn what is meant by secure coding?" This unique SANS course allows you to bone up on the skills and knowledge required to prevent your applications from getting hacked.

This is a comprehensive course covering a huge set of skills and knowledge. It's not a high-level theory course. It's about real programming. In this course you will examine actual code, work with real tools, build applications, and gain confidence in the resources you need for the journey to improving the security of Java applications.

Rather than teaching students to use a set of tools, we're teaching students concepts of secure programming. This involves looking at a specific piece of code, identifying a security flaw, and implementing a fix for flaws found on the Top 10 and CWE/SANS Top 25 Most Dangerous Programming Errors.

The class culminates in a Secure Development Challenge where you perform a security review of a real-world open source application. You will conduct a code review, perform security testing to actually exploit real vulnerabilities, and finally, using the secure coding techniques that you have learned in class, implement fixes for these issues.

## Who Should Attend

- Developers who want to build more secure applications
- Java EE programmers
- Software engineers
- Software architects
- Application security auditors
- Technical project managers
- Senior software QA specialists
- Penetration testers who want a deeper understanding of target applications or who want to provide more detailed vulnerability remediation options


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## DEVELOPER 544

Four-Day Program | Mon, Sept 16 - Thu, Sept 19 | 9:00am - 5:00pm

24 CPE/CMU Credits | Laptop Required | GIAC Cert: GSSP-.NET | Instructor: James Jardine

DEV544: **Secure Coding in .NET: Developing Defensible Applications**

ASP.NET and the .NET framework have provided web developers with tools that allow them an unprecedented degree of flexibility and productivity. On the other hand, these sophisticated tools make it easier than ever to miss the little details that allow security vulnerabilities to creep into an application. Since ASP.NET, 2.0, Microsoft has done a fantastic job of integrating security into the ASP.NET framework, but the onus is still on application developers to understand the limitations of the framework and ensure that their own code is secure.

During this four-day course we will analyze the defensive strategies and technical underpinnings of the ASP.NET framework and learn where, as a developer, you can leverage defensive technologies in the framework, and where you need to build security in by hand. We'll also examine strategies for building applications that will be secure both today and in the future.

Rather than focusing on traditional web attacks from the attacker's perspective, this class will show developers first how to think like an attacker, and will then focus on the latest defensive techniques specific to the ASP.NET environment. The emphasis of the class is a hands-on examination of the practical aspects of securing .NET applications during development.

Have you ever wondered if ASP.NET Request Validation is effective? Have you been concerned that XML web services might be introducing unexamined security issues into your application? Should you feel uneasy relying solely on the security controls built into the ASP.NET framework? Secure Coding in ASP.NET will answer these questions and far more.

## Who Should Attend

- This class is focused specifically on software development but is accessible enough for anyone who's comfortable working with code and has an interest in understanding the developer's perspective
- Software developers and architects
- Senior software QA specialists
- System and security administrators
- Penetration testers


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## SEC434: Log Management In-Depth: Compliance, Security, Forensics, and Troubleshooting

Two-Day Program | Sat, Sept 14 - Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Required | Instructor: Dr. Eric Cole

This first-ever dedicated log management class teaches system, network, and security logs, and their analysis and management. It covers the complete life-cycle of dealing with logs: the whys, hows, and whats.

You will learn how to enable logging and then how to deal with the resulting data deluge by managing data retention, analyzing data using search, filtering and correlation, and then applying what you learned to key business and security problems. The class also teaches applications of logging to forensics, incident response and regulatory compliance.

In the beginning, you will learn what to do with various log types and provide brief configuration guidance for common information systems. Next, you will learn a phased approach to implementing a company-wide log management program, and go into specific log-related tasks that need to be done on a daily, weekly, and monthly basis with regard to log review and monitoring.

Everyone is looking for a path through the PCI DSS and other regulatory compliance mazes, and that is what you will learn in the next section of the course. Logs are essential for resolving compliance challenges; this class will teach you

what you need to concentrate on and how to make your log management compliance-friendly. People who are already using log management for compliance will learn how to expand the benefits of their log management tools beyond compliance.

You will learn to leverage logs for critical tasks related to incident response, forensics, and operational monitoring. Logs provide one of the key information sources when responding to an incident and this class will teach you how to utilize various log types in the frenzy of an incident investigation.

The class also includes an in-depth look at deploying, configuring and operating an open source tool OSSEC for log analysis, alerting and event correlation.

Finally, the class author, Dr. Anton Chuvakin, probably has more experience in the application of logs to IT and IT security than anyone else in the industry. This means he and the other instructors chosen to teach this course have made a lot of mistakes along the way. You can save yourself a lot of pain and your organization a lot of money by learning about the common mistakes people make working with logs.

## SEC524: Cloud Security Fundamentals

Two-Day Program | Sat, Sept 14 - Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Required | Instructor: Dave Shackleford

Many organizations today are feeling pressure to reduce IT costs and optimize IT operations. Cloud computing is rapidly emerging as a viable means to create dynamic, rapidly provisioned resources for operating platforms, applications, development environments, storage and backup capabilities, and many more IT functions. A staggering number of security considerations exist that information security professionals need to consider when evaluating the risks of cloud computing.

The first fundamental issue is the loss of hands-on control of system, application, and data security. Many of the existing best practice security controls that infosec professionals have come to rely on are not available in cloud environments, stripped down in many ways, or not able to be controlled by security teams. Security professionals must become heavily involved in the development of contract language and Service Level Agreements (SLAs) when doing business with Cloud Service Providers (CSPs). Compliance and auditing concerns are compounded. Control verification and audit reporting within CSP environments may be less in-depth and frequent as audit and security teams require.

The SANS Cloud Security Fundamentals course starts out with a detailed introduction to the various delivery models of cloud computing ranging from Software as a Service (SaaS) to Infrastructure as a Service (IaaS) and everything in between. Each of these delivery models represents an entirely separate set of security conditions to consider, especially when coupled with various cloud types including: public, private, and hybrid. An overview of security issues within each of these models will be covered with in-depth discussions of risks to consider.

Attendees will go in-depth on architecture and infrastructure fundamentals for private, public, and hybrid clouds. A wide range of topics will be covered including patch and configuration management, virtualization security, application security, and change management. Policy, risk assessment, and governance within cloud environments will be covered with recommendations for both internal policies and contract provisions to consider. This path leads to a discussion of compliance and legal concerns. The first day will wrap up with several fundamental scenarios for students to evaluate.

Attendees will start off the second day with coverage of audits and assessments for cloud environments. The day will include hands-on exercises for students to learn about new models and approaches for performing assessments, as well as evaluating audit and monitoring controls. Next the class will turn to protecting the data itself! New approaches for data encryption, network encryption, key management, and data lifecycle concerns will be covered in-depth. The challenges of identity and access management in cloud environments will be covered. The course will move into disaster recovery and business continuity planning using cloud models and architecture. Intrusion detection and incident response in cloud environments will be covered along with how best to manage these critical security processes and technologies that support them given that most controls are managed by the CSP.

*“Entirely new information and aspects to consider. This course is a must for any info sec manager as we move to the age of outsourcing to the Cloud.”*

—TIM CRAIG, VySTAR CREDIT UNION

## SEC546: IPv6 Essentials

Two-Day Program | Sat, Sept 14 - Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Required | Instructor: Dr. Johannes Ullrich

We are out of IPv4 addresses. ISPs worldwide will have to rapidly adopt IPv6 in the years ahead in order to grow, in particular as mobile devices require more and more address space. Already, modern operating systems implement IPv6 by default. Windows 7, for example, ships with Teredo enabled by default. This course is designed not just for implementers of IPv6, but also for those who just need to learn how to detect IPv6 and defend against threats unintentional IPv6 use may bring.

IPv6 is currently being implemented at a rapid pace in Asia in response to the exhaustion of IPv4 address space, which is most urgently felt in rapidly growing networks in China and India. Even if you do not feel the same urgency of IP address exhaustion, you may have to connect to these IPv6 resources as they become more and more important to global commerce.

### The Security Impact of IPv6

Implementing IPv6 should not happen without carefully considering the security impact of the new protocol. Even if you haven't implemented it yet, the ubiquitous IPv6 support in modern operating systems easily leads to unintentional IPv6 implementation, which may put your network at risk. In this course, we will start out by introducing the IPv6 protocol, explaining in detail many of its features like the IPv6 header, extension headers and auto configuration. Only by understanding the design of the protocols in depth will it be possible to appreciate the various attacks and mitigation techniques. The course will address how to take advantage of IPv6 to re-think how to assign addresses in your network

and how to cope with what some suggest is the biggest security problem in IPv6: no more NAT! IPv6 doesn't stop at the network layer. Many application layer protocols change in order to support IPv6, and we will take a close look at protocols like DNS, DHCPv6 and more.

### What You Will Learn

The course covers various security technologies like firewalls and Intrusion Detection and Prevention Systems (IDS/IPS). It also addresses the challenges in adequately configuring these systems and makes suggestions as to how to apply existing best practices to IPv6. Upcoming IPv6 attacks are discussed using tools like the THC IPv6 attack suite and others as an example.

This course will introduce network administrators and security professionals to the basic concepts of IPv6. While it is an introduction to IPv6, it is not an introduction to networking concepts. You should understand and be aware of the basic concepts of IPv4, and networking in general. It is an ideal refresher if you took SEC503 Intrusion Detection in Depth.

However, you do not need to know IPv4 in the full detail in which it is presented in SEC503. The networking and IPv4 principles taught in SEC401 Security Essentials should prepare you for this course.

*"IPv6 is here and it's enabled. If you don't know how to control it on your network the rest of the world is going to do it for you."*

-ADAM JASIONKOWSKI,  
HOLYOKE GAS AND ELECTRIC

*"These are the best labs I've ever done and the instructor expertise is greatly appreciated."*

-MICHAEL HARPER,  
BOSTON MEDICAL CENTER HEALTHNETPLAN

## SEC580: Metasploit Kung Fu for Enterprise Pen Testing

Two-Day Program | Sun, Sept 22 - Mon, Sept 23 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Required | Instructor: Bryce Galbraith

Many enterprises today face regulatory or compliance requirements that mandate regular penetration testing and vulnerability assessments. Commercial tools and services for performing such tests can be expensive. While really solid free tools such as Metasploit are available, many testers do not understand the comprehensive feature sets of such tools and how to apply them in a professional-grade testing methodology. Metasploit was designed to help testers with confirming vulnerabilities using an Open Source and easy-to-use framework. This course will help students get the most out of this free tool.

This class will show students how to apply the incredible capabilities of the Metasploit Framework in a comprehensive penetration testing and vulnerability assessment regimen, according to a thorough methodology for performing effective tests. Students who complete the course will have a firm understanding of how Metasploit can fit into their penetration testing and day-to-day assessment activities. The course will provide an in-depth understanding of the Metasploit Framework far beyond simply showing attendees how to exploit a

remote system. The class will cover exploitation, post-exploitation reconnaissance, token manipulation, spear-phishing attacks, and the rich feature set of the Meterpreter, a customized shell environment specially created for exploiting and analyzing security flaws.

The course will also cover many of the pitfalls that a tester may encounter when using the Metasploit Framework and how to avoid or work around them, making tests more efficient and safe.

*"Wow! Take this class!"*

-TODD HICK, BIMA



## MGT305: Technical Communication and Presentation Skills for Security Professionals

One-Day Program | Sun, Sept 15 | 9:00am - 5:00pm | 6 CPE/CMU Credits | Laptop Required | Instructor: SANS Staff

This course is designed for every IT professional in your organization. In this course we cover the top techniques that will show any attendee how to research and write professional quality reports, how to create outstanding presentation materials, and as an added bonus, how to write expert witness reports. Attendees will also get a crash course on advanced public speaking skills.

Writing reports is a task that many IT professionals struggle with, sometimes from the perspective of writing the report and other times from the perspective of having to read someone else's report! In the morning material we cover step by step how to work through the process of identifying critical ideas, how to properly research them, how to develop a strong argument in written form, and how to put it all down on paper. We also discuss some of the most common mistakes that can negatively impact the reception of your work and show how to avoid them. Attendees can expect to see the overall quality of their reports improve significantly as a result of this material.

After writing a meaningful report, it is not uncommon to find that we must present the key findings from that report before an audience, whether that audience is our department, upper management, or perhaps even the entire organization. How do you transform an excellent report into a powerful presentation? We will work through a

process that works to either condense a report into a presentation or can even be used to write a presentation from scratch that communicates your important thoughts in a meaningful and interesting way.

Writing the presentation is only half of the battle, though. How do you stand up in front of a group of five or even five thousand and speak? In the afternoon we will share tips and techniques of top presenters that you can apply to give the best presentation of your career. Additionally, students will have the opportunity to work up and deliver a short presentation to the class followed by some personal feedback from one of SANS' top speakers.

Professionals like you have come to expect the very best in materials and presentation quality from SANS courses. In this course we have distilled the elements that go into writing high-quality material and the skills required to be a top public speaker from nearly two decades of experience. For years students have asked for a course on writing and delivering presentations; this course is the answer!



[www.sans.edu](http://www.sans.edu)

*"Tips for impactful presentations and avoiding common errors were extremely valuable."*

-MARK ALLEN, SCOTT AND WHITE

### Who Should Attend

- All STI master's degree students
- Auditors
- Security architects
- Managers
- Incident handlers
- Forensic examiners
- Individuals seeking to improve their technical writing, presentation, and reporting skills
- Individuals who write reports or make presentations to management
- Awareness trainers and local mentors
- Management should strongly consider sending individuals who must write and present reports and project plans to this course

*"Everyone needs to work on being a more effective communicator."*

-COLBY CANUTT, UTC FIRE & SAFETY

## MGT433: Securing The Human: Building and Deploying an Effective Security Awareness Program

Two-Day Program | Sat, Sept 14 - Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Not Needed | Instructor: Lance Spitzner

Organizations have invested in information security for years now. Unfortunately, almost all of this effort has been focused on technology with little, if any, effort on the human factor. As a result, the human is now the weakest link. From RSA and Epsilon to Oak Ridge National Labs and Google, the simplest way for cyber attackers to bypass security is to target your employees. One of the most effective ways to secure the human is an active awareness and education program that goes beyond compliance and changes behaviors. In this challenging course, you will learn the key concepts and skills to plan, implement, and maintain an effective security awareness program that makes your organization both more secure and compliant. In addition, you will develop metrics to measure the impact of your program and demonstrate value. Finally, through a series of labs and exercises, you will develop your own project and execution plan, so you can immediately implement your customized awareness program upon returning to your organization.



[www.sans.edu](http://www.sans.edu)

### SANS SIMULCAST

If you are unable to attend this event, this course is also available in SANS Simulcast. More info on page 70.

*"MGT433 gives great view on how to build a full security program."*

-EMAN AL AWADHI, TRA

### Who Should Attend:

- Security awareness training officers
- Chief Security Officers (CSOs) and security management
- Security auditors, governance, and compliance officers
- Training, human resources, and communications staff
- Organizations regulated by Health Insurance Portability and Accountability Act (HIPAA), Federal Information Security Management Act (FISMA), Family Educational Rights and Privacy Act (FERPA), Payment Card Industry-Data Security Standards (PCI-DSS), ISO/IEC 27001, Family Educational Rights and Privacy Act (FERPA), Sarbanes-Oxley Act (SOX), or any other compliance-driven standards
- Anyone responsible for planning, deploying, or maintaining an awareness program



**MGT535: Incident Response Team Management**

One-Day Program | Sun, Sept 15 | 9:00am - 5:00pm | 6 CPE/CMU Credits | Laptop Required | Instructor: Christopher Crowley

This course will take you to the next level of managing an incident response team. Given the frequency and complexity of today's attacks, incident response has become a critical function for organizations. Detecting and efficiently responding to incidents, especially those where critical resources are exposed to elevated risks, has become paramount, and to be effective, incident response efforts must have strong management processes to facilitate and guide them. Managing an incident response team requires special skills and knowledge. A background in information security management or security engineering is not sufficient for managing incidents. Furthermore, incident responders with strong technical skills do not necessarily become effective incident response managers. Special training is necessary.

This course was developed by an information security professional with over 26 years of experience, much of it

in incident response. He was the founder of the first U.S. government incident response team. Students will learn by applying course content through hands-on skill-building exercises. These exercises range from writing and evaluating incident response procedures to the table-top validation of procedures, incident response management role playing in hypothetical scenarios, and hands-on experience in tracking incident status in hypothetical scenarios.

**Who Should Attend**

- Information security engineers and managers
- IT managers
- Operations managers
- Risk management professionals
- IT/system administration/network administration professionals
- IT auditors
- Business continuity and disaster recovery staff

**NEW!****Assembly Language Fundamentals of Penetration Testing & Reversing**

Two-Day Program | Sat, Sept 14 - Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Required | Instructor: David Hoelzer

Has it been a really long time since you learned Assembly language? Are you planning to attend a reverse engineering, advanced penetration testing or exploit development course? If so, you may want to attend this two-day crash course!

In this course, you will build code that can serve as the basis of a cold-boot attack to extract memory from a laptop or other computer while learning or refreshing your Assembly skills. Over the course of two days, you will learn how to write

boot sectors and design Assembly routines in addition to learning how to identify common high-level programming language structures within Assembly code when reverse engineering. Along the way you will receive a crash course introduction to the most common elements of the Intel instruction set and the most common data structures that you will encounter when reverse-engineering code or debugging for exploitation purposes.

## IT AUDIT SKILL-BASED COURSE

**NEW!****AUD444: Auditing Security and Controls of Active Directory and Windows**

Three-Day Program | Mon, Sept 16 - Wed, Sept 18 | 9:00am - 5:00pm | 18 CPE/CMU Credits | Laptop Required | Instructor: Bryan Simon

Auditors need to be able to understand how Active Directory operates and the key business risks that are present. This course was written to teach auditors how to identify and assess those business risks. Active Directory and Windows systems are typically well known and utilized within organizational infrastructures. However, they can be difficult to audit since there are a large number of settings on the end system. This course provides the tools and techniques to effectively conduct an Active Directory and Windows audit, and while doing so identify key business process controls

that may be missing. Students have the opportunity to look at the business process controls and then how those can be verified by looking at Active Directory and the Windows systems that exist. Plus, students are given the knowledge to be able to add additional value as part of their audits by being able to identify the technology risks that may have been overlooked. The hands-on exercises reinforce the topics discussed in order to give students the opportunity to conduct an audit on their own Windows systems, as well as understand the different security options that Windows provides.

**Who Should Attend**

- Internal auditors
- IT specialist auditors
- IT auditors
- IT audit managers
- Information system auditors
- Information security officers

*SANS Hosted are a Series of Classes presented by other educational providers to complement your needs for training outside of our current course offerings.*

## Hosted: (ISC)<sup>2</sup>® Certified Secure Software Lifecycle Professional (CSSLP®) CBK® Education Program

Five-Day Program | Mon, Sept 16 - Fri, Sept 20 | 9:00am - 5:00pm | 35 CPE/CMU Credits | Laptop NOT Required | Instructor: (ISC)<sup>2</sup> Instructor

This course will help you advance your software development expertise by ensuring you're properly prepared to take on the constantly evolving vulnerabilities exposed in the Systems Development Life Cycle (SDLC). It will train you on every phase of the SDLC detailing security measures and best practices for each phase. The CSSLP® Education Program is for all the stakeholders involved in software development. By taking this course, you will enhance your ability to develop software with more assurance and understand how to build security within each phase of the software lifecycle.

The comprehensive (ISC)<sup>2</sup> CSSLP® CBK® Education program covers the following domains:

- **Secure Software Concepts** - security implications in software development
- **Secure Software Requirements** - capturing security requirements in the requirements gathering phase
- **Secure Software Design** - translating security requirements into application design elements CSSLP
- **Secure Software Implementation/Coding** - unit testing for security functionality and resiliency to attack, and developing secure code and exploit mitigation
- **Secure Software Testing** - integrated QA testing for security functionality and resiliency to attack
- **Software Acceptance** - security implication in the software acceptance phase
- **Software Deployment, Operations, Maintenance and Disposal** - security issues around steady state operations and management of software

### Who Should Attend:

- Software Architects
- Software Engineers/Designers
- Software Development Managers
- Requirements Analysts
- Project Managers
- Business and IT Managers
- Auditors
- Developers and Coders
- Security Specialists
- Auditors and Quality Assurance Managers
- Application Owners

**NEW!**

## Hosted: Social Engineering For Pentesters

Five-Day Program | Mon, Sept 16 - Fri, Sept 20 | 9:00am - 5:00pm | 40 CPE/CMU Credits | Laptop Required

Instructors: Christopher Hadnagy, Michele Fincher

There are dozens of classes designed to help people in the career of penetration testing, but there has not been any course that focuses on teaching you the skills, mindset and tools needed to be a social engineering penetration tester until now.

The skill set needed to be a professional social engineer blends a person's mental skills of influence, persuasion and psychological tactics with technical skills such as lock picking, mastering elicitation and pretexting. The Social Engineering Penetration Testers program is a five-day immersion into the world of a professional social engineer.

This course is designed to be more than a series of lectures: it's an intensely interactive class where you will practice the skills needed to be a professional social engineer. Each day is filled with information-packed discussion, multiple hands-on exercises, live demonstrations, and a hands-on homework assignment each night.

### Author Statement

There are dozens of classes designed to help people in the career of penetration testing, but there has not been any course that focuses on teaching you the skills, mindset, and tools needed to be a social engineering penetration tester... until NOW. The skill set needed to be a professional social engineer blends a person's mental skills of influence, persuasion and psychological tactics with technical skills such as lock picking, mastering elicitation and pretexting. The Social-Engineer, Inc. Social Engineering for Penetration Testers course is a week-long immersion into the world of a professional social engineer. This course is designed to be more than a series of lectures: it's an intensely interactive class where you will practice the skills needed to be a professional social engineer. Each day is filled with information-packed discussion, multiple hands-on exercises, live demonstrations, and a hands-on homework assignment each night.

- Chris Hadnagy

### Who Should Attend:

Students who have a desire to be challenged, want an extremely hands on class and enjoy learning new things should attend this course.

### Certifications

After the course you can schedule your practical exam. If you succeed in passing, you will earn a certification that shows you have acquired the skills needed to be labeled a Social Engineering Pentest Professional (S.E.P.P).

**NEW!****Hosted: Onapsis: Securing the SAP Platform****Hands-on Security Techniques to Protect Critical Business Information and Infrastructure from CyberAttacks and Threats****Two-Day Program | Sat, Sept 14 - Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Required****Instructors: Mariano Nunez, Juan Perez-Etchegoyen**

This course provides the latest information on SAP-specific cyber-attacks and protection techniques. SAP platforms contain the business-critical information of the largest organizations in the world. While leading companies are protecting their businesses from modern threats against ERP systems, there are still many who are prone to SAP application-layer vulnerabilities that are exposing them to espionage, sabotage and financial fraud attacks. In this intensive hands-on course, with over ten (10) live demonstrations and numerous exercises (20), the training will help you answer the following questions:

- **Do you know how to assess or check whether the organization's SAP Platform is secure?**
- **What is the potential impact to the organization if its SAP Platform is attacked?**
- **Do you know how to prevent the attacks?**
- **What are the best practices to effectively mitigate them and protect business-critical information?**

Utilizing 'FREE' tools are an important part of the course and you will learn to master Onapsis' Bizploit, the first open-source ERP penetration testing framework. You get real-time feedback on whether your systems are exposed to

the critical attack vectors. The hands-on exercises will teach you the industry-standard methodology to perform SAP application vulnerability assessments, security audits, and penetration tests.

The training you will receive in this course is unique and valuable because the instructors have worked with some of the largest companies (thousands of SAP users) in the world, understand how SAP systems function in the real world, and stay up-to-date on common attacks and threats. They have evaluated over 2,000 SAP Application Servers, and 95% are exposed to espionage, sabotage, and fraud.

You will understand why Segregation of Duties controls (enforced by strict SAP user roles and profiles) are not enough to protect an SAP system, and how malicious hackers could break into unsecured systems anonymously, even without having a valid user. With a unique focus on the SAP application layer, you will learn the key security aspects of several SAP proprietary components and technologies, such as the SAProuter, SAP Web Dispatcher, SAP Gateway, SAP Message Server, SAP Web Applications (Enterprise Portal, WebAS and ITS), the SAP RFC and P4 interfaces, SAP Solution Manager, SAP Management Console, SAP-specific backdoors and rootkits, SAP forensics, ABAP code vulnerabilities and much more!

Previous SAP expertise is NOT required!

**Hosted: Offensive Countermeasures: The Art of Active Defenses****Two-Day Program | Sat, Sept 14 – Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop Required | Instructor: John Strand**

Active Defenses have been capturing a large amount of attention in the media lately. There are those who thirst for vengeance and want to directly attack the attackers. There are those who believe that any sort of active response directed at an attacker is wrong. We believe the answer is somewhere in between.

In this class you will learn how to force an attacker to take more moves to attack your network. Moves that can increase your ability to detect them. You will learn how to gain better attribution as to who is attacking you and why. You will also find out how to get access to a bad guys system. And most importantly, you will find out how to do the above legally.

The current threat landscape is shifting. Traditional defenses are failing us. We need to develop new strategies to defend ourselves. Even more importantly, we

need to better understand who is attacking us and why. Some of the things we talk about you may implement immediately, others may take you a while to implement. Either way, consider what we discuss as a collection of tools at your disposal when you need them to annoy attackers, attribute who is attacking you and, finally, attack the attackers.

This class is based on the DARPA funded Active Defense Harbinger Distribution live Linux environment. This VM is built from the ground up for defenders to quickly implement Active Defenses in their environments. This class is also very heavy with hands-on labs. We won't just talk about Active Defenses. We will be doing hands on labs and through them in a way that can be quickly and easily implemented in your environment.

**Hosted: Physical Penetration Testing – Introduction****Two-Day Program | Sat, Sept 14 – Sun, Sept 15 | 9:00am - 5:00pm | 12 CPE/CMU Credits | Laptop NOT Required | Instructor: Deviant Ollam**

Physical security is an oft-overlooked component of data and system security in the technology world. While frequently forgotten, it is no less critical than timely patches, appropriate password policies, and proper user permissions. You can have the most hardened servers and network but that doesn't make the slightest difference if someone can gain direct access to a keyboard or, worse yet, march your hardware right out the door.

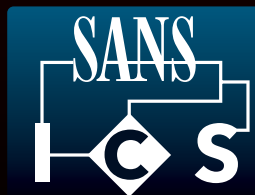
Those who attend this session will leave with a full awareness of how to best protect buildings and grounds from unauthorized access, as well as how to compromise most existing physical security in order to gain access themselves. Attendees will not only learn how to distinguish good locks and access control from poor ones, but will also become well-versed in picking and bypassing many of the most common locks used in North America in order to assess their own company's security posture or to augment their career as a penetration tester.





# SANS Hosted Courses

*Hosted by*



Industrial  
Control  
Systems

**Critical Infrastructure and  
Control System Cybersecurity**

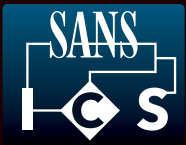
*(Page 63)*

**Pentesting ICS and Smart Grid**

*(Page 64)*

**SCADA Security Training**

*(Page 65)*



Industrial  
Control  
Systems

HOSTED:

# Critical Infrastructure and Control System Cybersecurity

Five-Day Program | Mon, Sept 16 - Fri, Sept 20 | 9:00am - 5:00pm | 30 CPE/CMU Credits | Laptop Provided  
Instructor: Matthew Luallen

*This course is an intermediate to advanced course covering control system cybersecurity vulnerabilities, threats and mitigating controls. This course will provide hands-on analysis of control system environments allowing students to understand the environmental, operational and economic impacts of attacks like Stuxnet and supporting mitigating controls.*

## What are the security risks of Control System components, communication protocols and operations?

Whether the Control System is automating an industrial facility or a local amusement park roller coaster, the system was designed to operate in a physically, cyber and operationally secure domain. This domain extends throughout the facility using a combination of Programmable Logic Controllers, Programmable Automation Controllers, Embedded Logic Controllers, Remote Terminal Units, and Human Machine Interfaces interlinked with one or a variety of SCADA systems and communication protocols across local and long distance geographic regions. The risks vary from simple eavesdropping or electronic denial of service to more sophisticated asset misuse and destruction. To further compound the challenge, today there are not enough professionals with security skills to sufficiently deter, detect and defend against active threats to our critical infrastructure's control systems.

## How can we progress from Control System security policy development to design, deployment, and assessment?

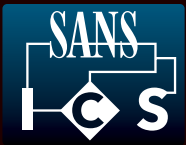
This course was designed to help organizations struggling with control system cybersecurity by equipping personnel with the skills needed to design, deploy, operate, and assess a control system's cybersecurity architecture. The course begins by quickly describing the risks and then introducing the participants to a customizable actuator and sensor control system trainer and programmable logic environment. This automation programming analysis creates the platform to identify logic flaws that combined with active cyber, physical, and operational procedures may lead to increased risk. The participants then utilize this knowledge to analyze the control system architecture through cyber, physical and operational risks including:

- Control System component engineered, programmed and firmware logic flaws
- Wired and wireless communication protocol analysis
- Physical, cyber and operational procedures
- Deterrence, detection and response to threats

The participant's knowledge is challenged through non-kinetic and kinetic analysis associated with common industry components as well as red team/blue team exercises of both physical and simulated control system environments such as Traffic Lights, Chemical Storage and Mixing, Pipelines, Robotic Arms, Heavy Rail and Power Grids.

## What is critical infrastructure Control System cybersecurity?

Control Systems (Local, Distributed and SCADA systems) are used throughout the world to automate common processes. These systems need to provide reliable and safe automation for such critical infrastructures as the Bulk Electric System (BES), natural gas, oil, transportation, chemical, mining, fresh water/waste water, manufacturing, food, and defense. The critical necessities for both government and its people to survive are automated using industrial control systems. In the past decade, advances in technology have added automation that has intertwined these systems with the Internet, wireless, business networks and traditional hardware and communications protocols. Many Control Systems (CSs) are in some way electronically connected to networks of less trust, potentially even a slight distance away from the Internet. These CSs typically use vulnerable communication protocols. Many even use TCP/IP and in specific situations, common off-the-shelf hardware and chipsets. It is paramount to the safety of our society to sufficiently understand the architecture of and protect these critical systems.



Industrial  
Control  
Systems

**HOSTED:**

# **Pentesting ICS and Smart Grid**

**Five-Day Program | Mon, Sept 16 - Fri, Sept 20 | 9:00am - 5:00pm | 30 CPE/CMU Credits | Laptop Required**  
**Instructor: Justin Searle**

This is not your traditional SCADA security course! This course teaches hands-on penetration testing techniques used to test embedded electronic field devices, network protocols, RF communications, and controlling servers of ICS and Smart Grid systems like PLCs, RTUs, smart meters, Home Area Networks (HAN), smart appliances, SCADA, substation automation, and synchrophasors. This course is structured around the formal penetration testing methodology created by the National Energy Sector Cybersecurity Organization Resource (NESCOR), a United States Department of Energy project.

Using this methodology and SamuraiSTFU (Security Testing Framework for Utilities), an open source Linux distribution for pentesting energy sector systems and other critical infrastructure, we'll perform hands-on penetration testing tasks on embedded electronic field devices, their RF communications, and the myriad of user interfaces used throughout smart grid systems. We'll tie these techniques and exercises back to the smart grid devices that can be tested using these techniques. We will also do exercises on dissecting and fuzzing smart grid protocols like modbus, DNP3, IEC 61850, IEC 60870-5-104, ZigBee, C37.118, and C12.22. The course exercises will be performed on a mixture of real world and simulated devices to give students the most realistic experience possible in a portable classroom setting.

**Day 1: ICS Architectures and Network Pentesting**

**Day 2: Pentesting Master Server User Interfaces**

**Day 3: Pentesting ICS Network Protocols**

**Day 4: Pentesting ICS Field and Floor Devices**

**Day 5: Pentesting ICS Field and Floor Devices (continued)**



Register at [www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)  
or call 301-654-SANS (7267)

For course updates, prerequisites, special notes, or laptop requirements, visit [www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)

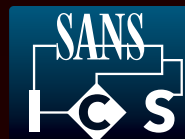


HOSTED:

# SCADA Security Training

Five-Day Program | Mon, Sept 16 - Fri, Sept 20 | 9:00am - 5:00pm | 30 CPE/CMU Credits | Laptop Required

Instructor: Jonathan Pollet



Industrial  
Control  
Systems

This 5-day course bridges the gap between SCADA Engineers and IT Security Professionals. During the first day, all students are taught how SCADA and Telemetry systems work from the ground up with several hands-on exercises. Everyone builds their own SCADA HMI Application, captures and analyzes SCADA protocols, configures their own OPC Server, and develops a small SCADA system from the I/O level up through to the HMI. The instructor then shares SCADA vulnerabilities and threat trends from assessments conducted in the field. The course then covers both active and passive security testing techniques, and how to safely conduct security assessments on live operational SCADA equipment.

Once everyone understands how these systems operate, and how to test them for vulnerabilities, the course dives deeper into system exploitation. All students are taught how to use BackTrack and the Metasploit environment to create their own exploits and cyber attacks through step-by-step hacking instruction. Students are provided with several structured virtual machine environments to deploy on their own laptops. These virtual machine environments contain pre-configured software with a wide variety of SCADA and security tools, which will be used to guide students through hands-on techniques on how to build, attack, and defend SCADA systems.

After everyone has built their own SCADA system, and spent time learning how to attack these real-time systems, the course rounds out the process by explaining how to defend these systems from similar threats. The defense techniques include how to design secure SCADA architectures, where to place firewalls, how to implement secure remote access into SCADA environments, where to deploy IDS / IPS systems, and tips for implementing centralized log aggregation and network monitoring solutions.

## Answer These and Other Similar Questions Related to SCADA Security

- What are unique vulnerabilities and security risks with ICS systems?
- What approach should be used to test Internet, Enterprise IT, and ICS Systems for security vulnerabilities?
- What are the common security weaknesses in Internet and Enterprise IT Systems that pose the greatest risk to ICS systems?
- Can poorly managed ICS systems pose an even greater risk to Enterprise IT and Internet-connected systems?
- What is a solid approach to testing SCADA systems for security vulnerabilities?
- When and how should you conduct Penetration Testing on live SCADA equipment?
- How do you use open source security tools to research and discover unknown vulnerabilities with ICS equipment?
- What are solid techniques to secure SCADA Systems that are not vendor-specific, and require low administrative overhead?
- Can social networking information about employees found in sites like Facebook, LinkedIn, MySpace, and Twitter be used to compromise critical industrial facilities?
- What is a Red Team or Tiger Team Attack Exercise, and how can these scenarios simulate a targeted attack on a SCADA facility?



Register at [www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)  
or call 301-654-SANS (7267)

For course updates, prerequisites, special notes, or laptop requirements, visit [www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)

# SANS@Night Evening Talks

Enrich your SANS training experience! Evening talks given by our instructors and selected subject matter experts help you broaden your knowledge, get the most for your training dollar, and hear from the voices that matter in computer security.

KEYNOTE:

## **APT: It is Time to Act**

*Dr. Eric Cole*

Albert Einstein said "We cannot solve our problems with the same thinking we used when we created them." With the new advanced and emerging threat vectors that are breaking into networks with relative ease, a new approach to security is required. The myth that these attacks are so stealthy they cannot be stopped is just not true. There is no such thing as an unstoppable adversary. It is time to act.

In this engaging talk one of the experts on APT, Dr. Cole, will outline an action plan for building a defensible network that focuses on the key motto that "Prevention is Ideal but Detection is a Must". Better understand what the APT really is and what organizations can do to be better prepared. The threat is not going away, so the more organizations can realign their thinking with solutions that actually work, the safer the world will become.

## **Crayons Never Uploaded Our Stuff to the Internet!**

### *Kids and Mobile Applications*

*Kevin and Brenna Johnson*

Kevin and Brenna "Hacker Princess" Johnson (his daughter) will be presenting this talk about mobile applications, privacy, and kids. In it, they will discuss some of the applications that are popular and how they abuse the kid's privacy. They will also discuss techniques the applications use to trick/encourage the child to purchase additional items. Finally they will walk attendees through some of the methods we can use to evaluate an application and help keep our kids safe online.

## **Windows Exploratory Surgery with Process Hacker**

*Jason Fossen*

In this talk we'll rummage around inside the guts of Windows while on the lookout for malware, using a free tool named Process Hacker (similar to Process Explorer). Understanding processes, threads, drivers, handles, and other OS internals is important for analyzing malware, doing forensics, troubleshooting, and hardening the OS. If you have a laptop, get Process Hacker from SourceForge.net and together we'll take a peek under the GUI to learn about Windows internals and how to use Process Hacker for combating malware.

<http://processhacker.sourceforge.net>

## **Unleashing the Dogs of (cyber) War** *Ed Skoudis*

With the onslaught of recent headlines containing revelations of nation-state activity in computer attacks, a lot of people are wondering: What the heck is going on? Although controversial in some quarters, the militarization of cyber space proceeds apace. Some think that military operations in cyber space are impossible, impractical, or just plain evil. In this lively and hard-hitting presentation, Ed Skoudis will analyze the trends and look at where such activities may be heading. We'll then focus on some of the ramifications for the hacker community. How could cyber military action impact you and your hacking research? What steps should hackers take to prepare for a significantly more militarized cyber space? We'll discuss those issues, and many more.

## **The Security Impact of IPv6**

*Dr. Johannes Ullrich*

IPv6 is more than just lots of addresses. IPv6 is protocol moving IP into the modern world of gigabit networks connecting billions of machines with gigabytes of RAM. In many ways, this transition is similar to the "DC" to "AC" conversion in the electric world. While we still use DC in many places, AC has shown to be more flexible and scalable. Its initial adoption was hindered by security concerns, and DC supporters like Edison went to great lengths to demonstrate the security problems by stealing pets and electrocuting them in public displays. The fear of IPv6 is in many ways a fear of the unknown. IPv6 has some inherent risks, in particular if the protocol opportunities are not well understood, and IPv4 thinking is applied to its deployment. We will discuss the impact of IPv6 on security architecture, intrusion detection, and network forensics, without harming anybody's pet.

## **Applying the 32 Zombieland Rules to IT Security**

*Larry Pesce*

OMG ZOMBIES!!! Did that get your attention? I'm a big fan of preparing for the "zombie apocalypse" but not so much a fan of zombie movies. I am, however, a huge fan of Zombieland. In the movie, the protagonists come up with 32 solid rules for survival in the zombie apocalypse. In this presentation, we'll take a tongue-in-cheek approach to how we can apply the 32 Zombieland rules to practical IT security techniques. Brains will not be served at this presentation.

## **Who's Watching the Watchers?** *Mike Poor*

We have instrumented our networks to the Nth degree. We have firewalls, IDS, IPS, Next Gen Firewalls, Log correlation and aggregation... but do we know if we have it right? Will we detect the NextGen(TM) attackers? In this talk we will explore ways that we improve the signal/noise ratio in our favor, and help identify the needle in the needlestack.

## **Information Assurance Metrics: Practical Steps to Measurement**

*James Tarala*

Show up to a security presentation, walk away with a specific action plan. In this presentation, James Tarala, a senior instructor with the SANS Institute, will be presenting on making specific plans for information assurance metrics in an organization. Clearly this is an industry buzzword at the moment (when you listen to presentations on the 20 Critical Controls, NIST guidance, or industry banter). Security professionals have to know that their executives are discussing the idea. So how do you integrate information assurance metrics in an organization and achieve value from the effort? Learn what efforts are currently underway in the industry to create consensus metrics guides and what initial steps an organization can take to start measuring the effectiveness of its security program. Small steps are better than no steps, and by the end of this presentation, students will have a start integrating metrics into their information assurance program.



## How the West was Pwned

G. Mark Hardy

Can you hear it? The giant sucking sound to the East? With it are going more than just manufacturing jobs – it's our manufacturing know-how, intellectual property, military secrets, and just about anything you can think of. If we're so technologically advanced, how are the People's Republic of China (PRC) and others able to continue to pull this off? Why do we keep getting pwned at our own game?

The Mandiant APT1 report released in February detailed research into People's Liberation Army (PLA) Unit 61398 and its significant penetration into Western networks. It was followed quickly by a series of political and diplomatic statements denouncing China's actions, which China flatly denied. Where's the truth? We'll try to find it.

Ed Skoudis spoke about "Unleashing the Dogs of (cyber) War," but there may not be a war. If a victor can extract tribute from the vanquished, war isn't necessary. Today, intellectual capital is a proxy for tribute. We'll look at some specifics, including documents that outline the plan of attack, details about what operations have been run against us, and progress in efforts to create an international legal framework for cyberwar in case the bits start flying.

## Sick Anti-analysis Mechanisms in the Wild

Alissa Torres

For those in the trenches of enterprise defense, it appears malware authors are deriving sick pleasure of late in mechanizing their end products with sophisticated self-defense and evasion capabilities. From "environmentally-aware" binaries to malware that defeats image acquisition, attackers are becoming increasingly more adept at evading analysis. During this presentation, several of these anti-analysis techniques will be explored, preparing attendees for what they are likely to encounter with increasing frequency – malware that fights back.

## InfoSec Vertigo: Small Medical Lab Wages War Against InfoSec Vendor, US Government, and Big DC Law Firm

Benjamin Wright and

Michael Daugherty, President of LabMD

Chilling true story: Aggressive infosec vendor magically acquires patient file from small medical lab, then campaigns for a hefty fee to 'remedy' the problem. Lab refuses to pay; vendor conveniently gives the file to US Federal Trade Commission, saying it was compromised in a security breach. Years of investigation and litigation ensue. Learn how our legal system separates fact, fiction, and ego in a modern cyber security incident.

## Hacking Your Friends and Neighbors For Fun

Joshua Wright

I regularly see my neighbors trying to connect to open wireless APs I run in my house. A while back, I set up a special open AP to give them Internet access. The cost? My entertainment.

My neighbor-hack AP is set up to manipulate the web traffic of its users, randomly redirecting people to websites of my choosing, manipulating the format and content of pictures they download and more. All it takes is an inexpensive AP, a Linux box, and an Internet connection.

In this talk, I'll show you how to set up your own neighbor-hack AP and, in the process, you'll learn just how scary (or fun) an open wireless AP can be.

## Vendor Expo

Tuesday, September 17, 2013

12:00pm - 1:30pm and 5:00pm - 7:00pm

Given that virtually everything in security is accomplished with a tool, exposure to those tools is a very important part of the SANS training event learning experience. Leading solutions providers will be on hand for a two-day vendor expo, an added bonus to registered training event attendees.

## Vendor-Sponsored Lunch Sessions

Tuesday, September 17, 2013 | 12:00pm - 1:30pm

Join these sponsoring vendors and others on the expo floor for an introduction to leading solutions and services that showcase the best options in information security.

## Vendor-Sponsored Lunch & Learn Presentations

Throughout SANS Network Security 2013, vendors will provide sponsored lunch presentations where attendees can interact with peers and receive education on vendor solutions. Take a break and get up-to-date on security technologies!

## Vendor Welcome Reception

Tuesday, September 17, 2013 | 5:00pm - 7:00pm

This informal reception allows you to visit exhibits and participate in some exciting activities. This is a great time to mingle with your peers and experience first-hand the latest in information security tools and solutions with interactive demonstrations. Enjoy appetizers and beverages while comparing experiences with other attendees regarding the solutions they are using to address security threats in their organization. Attendees can visit sponsors to receive raffle tickets and enter to win exciting prizes. Prize drawings occur throughout the expo.





# NETWARS

## A True Hands-On Interactive Security Challenge!

NetWars is a computer and network security challenge designed to test a participant's experience and skills in a safe, controlled environment while having a little fun with your fellow IT security professionals.

- ➔ Vulnerability Assessments
- ➔ System Hardening
- ➔ Malware Analysis
- ➔ Digital Forensics
- ➔ Incident Response
- ➔ Packet Analysis
- ➔ Penetration Testing
- ➔ Intrusion Detection

The NetWars competition will be played over two evenings: September 19-20.

Prizes will be awarded at the conclusion of the games.

REGISTRATION IS LIMITED AND IS FREE to students attending any long course at SANS Network Security 2013 (*NON-STUDENTS ENTRANCE FEE IS \$1,249*).

Register at  
[www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)



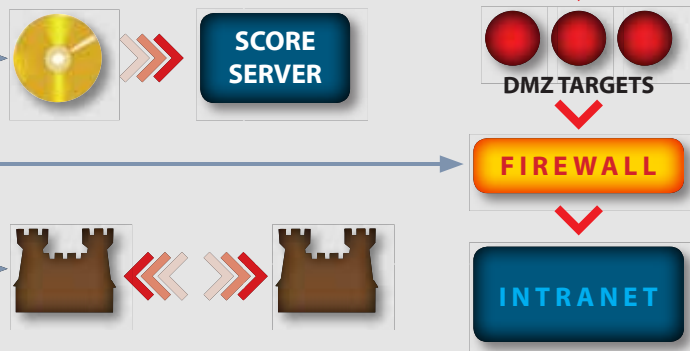
## How NetWars Works

At the outset of the challenge, each player must find hidden keys within a special image downloaded from the Internet and then use those keys to enter an online environment where knowledge of security vulnerabilities, their exploits, and their associated defenses can be turned into points.

NetWars has five separate levels, so players may quickly advance through earlier levels to their level of expertise. The entire challenge involves all five levels.

### Levels:

- 1) Played on CD image (Lin or Win), no superuser privs granted
- 2) Played on CD image (Lin or Win) with superuser
- 3) Played across the Internet, attacking DMZ
- 4) Played across the Internet, attacking internal network from DMZ
- 5) Played across the Internet, attacking other player's castles and defending your own



### Scoring

A comprehensive score card is generated for each player at the conclusion of the NetWars challenge. This detailed assessment illustrates the areas where participants have demonstrated skills and highlights other areas where skills can be refined or built.

### Scoreboard

- Scoreboard shows progress in real-time
- Great challenge at-a-glance view, depicting:
  - Challenges conquered
  - Territory still available
  - Momentum and rank
  - Time since last score



### Scoreboard Stats

- Scoreboard animation reveals other player stats
  - Accuracy
  - Speed
  - Percentage complete (*Rank and momentum always remain on the screen*)

### Benefits for Individuals

If you are a self-motivated security professional who really wants to put your knowledge to the test, then NetWars is an excellent opportunity for you to have fun and learn in a competition with other security professionals, practicing real-world tactics that could happen at any time.

- The detailed score card is an incomparable opportunity for you to analyze your security knowledge and decide in what other areas you would like to learn new skills or refine your existing ones.
- Demonstrate your experience to other security professionals.
- Stay on top of the latest attacks and see what your competition is doing.
- Participants who reach level three of NetWars will be eligible to receive 12 CMU credits towards GIAC certification renewal.

### Benefits for Organizations

How would your security team handle a real attack? Do they have the right skills and knowledge to defend vital systems? The NetWars simulation lets you see how your organization would react during an attack, but without the consequences.

- Test the experience and skills of your current security team and assess areas where further training is needed.
- Evaluate the experience of potential new hires.
- Use the score card to create a customized training program for your security personnel.







**You don't have to miss out on  
SANS' top-rated training.  
Attend select Network Security 2013  
courses remotely via SANS Simulcast!**

## How SANS Simulcast Works

Cutting-edge webcast technology and live instruction combine to deliver a fun and engaging remote learning experience. Remote students will also receive four months of access to an archived copy of the class to use as a reference tool or to catch up on a missed session. The platform is web-based so students simply need a solid Internet connection to participate.

## SANS Simulcast classes are:

### **COST-EFFECTIVE**

You can save thousands of dollars on travel costs, making Simulcast an ideal solution for students working with limited training budgets or travel bans.

### **ENGAGING**

Simulcast classes are live and interactive, allowing you to ask questions and share experiences with your instructor and classmates.

### **CONDENSED**

Complete your course quickly; Event Simulcast classes run all day in real time with select courses being held at our live training events. Custom Simulcast classes are just that, classes that can be customized to your training requirements.

### **REPEATABLE**

Simulcast classes are recorded and placed in an online archive in case you have to miss part of the class or just wish to view the material again at a later date.

### **COMPLETE**

You will receive the same books and course materials that conference students receive, and you will see and hear the same material presented to students at the events.



**"I was surprised how much I liked this format, (live virtual delivery) since I have attended other SANS classes in person. I was skeptical, but I loved it."**

**- JON TRUAN, OAK RIDGE NATIONAL LABORATORY**

**The following SANS Network Security 2013 courses will be available via SANS Simulcast:**

#### *Short Courses:*

**MGT433**

#### *Long Courses:*

**FOR508**

**SEC503**

**MGT414**

**SEC560**

**SEC301**

**SEC566**

**SEC401**

**To register for a SANS Network Security 2013**

**Simulcast course, please visit**

**[www.sans.org/simulcast](http://www.sans.org/simulcast)**



# How Are You Protecting Your

➤ **Data?**

➤ **Network?**

➤ **Systems?**

➤ **Critical  
Infrastructure?**



Risk management is a top priority.

The security of these assets depends on the skills and knowledge of your security team. Don't take chances with a one-size fits all security certification.

## **Get GIAC certified!**

GIAC offers over 20 specialized certifications in security, forensics, penetration testing, web application security, IT audit, management, and IT security law.

*"GIAC is the only certification that proves you have hands-on technical skills."*

-CHRISTINA FORD, DEPARTMENT OF COMMERCE

*"GIAC Certification demonstrates an applied knowledge versus studying a book."*

-ALAN C, USMC

Learn more about GIAC  
and how to *Get Certified* at  
**[www.giac.org](http://www.giac.org)**



# Department of Defense Directive 8570 (DoDD 8570)



## DoDD 8570 is changing to 8140 in 2013

[www.sans.org/8570](http://www.sans.org/8570)

Department of Defense Directive 8570 (DoDD 8570) provides guidance and procedures for the training, certification, and management of all government employees who conduct Information Assurance functions in assigned duty positions. These individuals are required to carry an approved certification for their particular job classification. GIAC provides the most options in the industry for meeting 8570/8140 requirements.

### DoD Baseline IA Certifications

IAT Level I	IAT Level II	IAT Level III	IAM Level I	IAM Level II	IAM Level III
A+-CE Network+CE SSCP	<b>GSEC</b> Security+CE SSCP	<b>GCIH</b> <b>CISSP</b> (or Associate) CISA	<b>GSLC</b> CAP Security+CE	<b>GSLC</b> <b>CISSP</b> (or Associate) CAP CISM	<b>GSLC</b> <b>CISSP</b> (or Associate) CISM

### Information Assurance System Architecture & Engineering (IASAE) Certifications

IASAE I	IASAE II	IASAE III
<b>CISSP</b> (or Associate)	<b>CISSP</b> (or Associate)	CISSP - ISSEP CISSP - ISSAP

### Computer Network Defense (CND) Certifications

CND Analyst	CND Infrastructure Support	CND Incident Responder	CND Auditor	CND Service Provider Manager
<b>GCIA</b> <b>GCIH</b> CEH	SSCP CEH	<b>GCIH</b> CSIH CEH	<b>GSNA</b> CISA CEH	CISSP - ISSMP CISM

### Computer Environment (CE) Certifications

GCWN	GCUX
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### SANS Training Courses for DoD Approved Certifications

SANS TRAINING COURSE	DoD APPROVED CERT
<b>SEC401</b> Security Essentials Bootcamp Style	<b>GSEC</b>
<b>SEC503</b> Intrusion Detection In-Depth	<b>GCIA</b>
<b>SEC504</b> Hacker Techniques, Exploits & Incident Handling	<b>GCIH</b>
<b>AUD507</b> Auditing Networks, Perimeters, and Systems	<b>GSNA</b>
<b>MGT414</b> SANS® +S™ Training Program for the CISSP® Certification Exam	<b>CISSP</b>
<b>MGT512</b> SANS Security Essentials for Managers with Knowledge Compression™	<b>GSLC</b>

### Compliance/ Recertification:

To stay compliant with DoD 8570 requirements, you must maintain your certifications. GIAC certifications are renewable every four years.

Go to [www.giac.org](http://www.giac.org) to learn more about certification renewal.

DoD 8570 certification requirements are subject to change, please visit <http://iase.disa.mil/eta/iawip> for the most updated version.

For more information,  
contact us at  
[8570@sans.org](mailto:8570@sans.org)  
or visit  
[www.sans.org/8570](http://www.sans.org/8570)





**Real Threats**  
**Real Skills**  
**Real Success**

**Join Today!**

# SANS

## CYBER GUARDIAN

P R O G R A M

This program begins with hands-on core courses that will build and increase your knowledge and skills. These skills will be reinforced by taking and passing the associated GIAC certification exam. After completing the core courses, you will choose a course and certification from either the Red or Blue Team. The program concludes with participants taking and passing the GIAC Security Expert (GSE) certification.

### Prerequisites

- Five years of industry-related experience
- A GSEC certification (with a score of 80 or above) or CISSP certification

### Core Courses

SEC503 (GCIA) | SEC504 (GCIH) | SEC560 (GPEN) | FOR508 (GCFA)

*After completing the core courses, students must choose one course and certification from either the Blue or Red Team*

### Blue Team Courses

SEC502 (GCFW)  
SEC505 (GCWN)  
SEC506 (GCUX)

### Red Team Courses

SEC542 (GWAPT)  
SEC617 (GAWN)  
SEC660 (GXPN)

Contact us at [onsite@sans.org](mailto:onsite@sans.org) to get started!  
[www.sans.org/cyber-guardian](http://www.sans.org/cyber-guardian)

# SECURITY AWARENESS

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[www.securingthehuman.org](http://www.securingthehuman.org)



# SANS Training Formats

## LIVE CLASSROOM TRAINING



### Multi-Course Training Events

*Live instruction from SANS' top faculty, vendor showcase, bonus evening sessions, and networking with your peers*

[www.sans.org/security-training/bylocation/index\\_all.php](http://www.sans.org/security-training/bylocation/index_all.php)



### Community SANS

*Live Training in Your Local Region with Smaller Class Sizes*

[www.sans.org/community](http://www.sans.org/community)



### OnSite

*Live Training at Your Office Location*

[www.sans.org/onsite](http://www.sans.org/onsite)



### Mentor

*Live Multi-Week Training with a Mentor*

[www.sans.org/mentor](http://www.sans.org/mentor)



### Summit

*Live IT Security Summits and Training*

[www.sans.org/summit](http://www.sans.org/summit)

## ONLINE TRAINING



### OnDemand

*All the Course Content at Your Own Pace*

[www.sans.org/ondemand](http://www.sans.org/ondemand)



### vLive

*Virtual Live Training from Your Home or Office*

[www.sans.org/vlive](http://www.sans.org/vlive)



### Simulcast

*Attend Event Training From Your Location*

[www.sans.org/simulcast](http://www.sans.org/simulcast)



### CyberCon

*Online Training Event*

[www.sans.org/event/cybercon-fall-2013](http://www.sans.org/event/cybercon-fall-2013)



### SelfStudy

*Independent Study with Books and MP3s*

[www.sans.org/selfstudy](http://www.sans.org/selfstudy)

# SANS Pen Test Hackfest SUMMIT & TRAINING EVENT

WASHINGTON, DC | SUMMIT: NOV 7-8 | COURSES: NOV 9-14

SANS is hosting our ultimate annual penetration testing training event in November. Featuring top-notch talks, in-depth training, and evening activities to help participants build awesome skills, the SANS Pen Test Hackfest Summit and Training Event is specially designed for penetration testers across a broad range of skills and disciplines. Here are the top 5 reasons to attend this event:

**NetWars, NetWars, NetWars!** This event will include FOUR full evenings of NetWars challenges, doubling the amount of NetWars time over a traditional SANS conference. NetWars is an action-packed challenge environment where people can build their skills while having fun.



**Coin-a-palooza** For participants who have taken a given SANS course, but have not won the capture-the-flag challenge coin, this event will offer the ability to catch up on the coins by participating in the four nights of NetWars challenges. If you've taken SEC504 in the past (but didn't win the coin), and make it from NetWars Level 1 into 2, you'll earn the 504 coin! If you make it into Level 3, you'll get your choice of a 542, 560, or 575 coin, provided you've taken the associated course sometime in the past. Make it into Level 4, and you'll get your choice of a 617, 642, or 660 coin if you've had those classes! And, if you win NetWars, you'll get the NetWars coin. With Coin-a-palooza, you'll have an opportunity to win up to 4 challenge coins for your collection.



**CyberCity** The SANS CyberCity project helps train cyber warriors whose computer and network skills can have major kinetic impact on the real-world. Working with a power grid, traffic lights, and water reservoir included in a physical model city, participants access and gain control over these assets, preventing attackers from wreaking havoc. This event will include a full evening session of CyberCity missions, the first time SANS has offered access to CyberCity at a training event!



**Summit** Two full-days of in-depth presentations chock full of cutting-edge penetration testing topics focused on helping you provide technical excellence and real business value in your vulnerability assessment and penetration testing work.

**Training** Six days of deep SANS training in real-world penetration techniques you can use immediately when you return to your job. The four courses are:

**SEC560**  
Network Penetration Testing  
and Ethical Hacking

**SEC575**  
Mobile Device Security  
and Ethical Hacking

**SEC642**  
Advanced Web App Penetration  
Testing and Ethical Hacking

**SEC660**  
Advanced Penetration Testing,  
Exploits, and Ethical Hacking

Learn more at [www.sans.org/event/pen-test-hack-fest-2013](http://www.sans.org/event/pen-test-hack-fest-2013)



# Future SANS Training Events



## Digital Forensics & Incident Response

SUMMIT 2013

Austin, TX  
July 9-16, 2013

[www.sans.org/  
event/dfir-summit-2013](http://www.sans.org/event/dfir-summit-2013)



## SANS Virginia Beach 2013

Virginia Beach, VA  
August 19-30, 2013

[www.sans.org/  
event/virginia-beach-2013](http://www.sans.org/event/virginia-beach-2013)



## SANS Rocky Mountain 2013

Denver, CO  
July 14-20, 2013

[www.sans.org/  
event/rocky-mountain-2013](http://www.sans.org/event/rocky-mountain-2013)



## SANS Capital City 2013

Washington, DC  
September 3-8, 2013

[www.sans.org/  
event/sans-capital-city-2013](http://www.sans.org/event/sans-capital-city-2013)



## SANS San Francisco 2013

San Francisco, CA  
July 29 - August 3, 2013

[www.sans.org/  
event/san-francisco-2013](http://www.sans.org/event/san-francisco-2013)



## SANS ICS Security Training Seattle

Seattle, WA  
Sept 30 - Oct 4, 2013

[www.sans.org/event/  
ics-security-seattle-2013](http://www.sans.org/event/ics-security-seattle-2013)



## SANS Boston 2013

Boston, MA  
August 5-10, 2013

[www.sans.org/  
event/boston-2013](http://www.sans.org/event/boston-2013)



## SANS Seattle 2013

Seattle, WA  
October 7-12, 2013

[www.sans.org/  
event/seattle-2013](http://www.sans.org/event/seattle-2013)



## Critical Security Controls SUMMIT

Washington, DC  
August 12-18, 2013

[www.sans.org/event/  
critical-security-controls-summit](http://www.sans.org/event/critical-security-controls-summit)



## Securing the Internet of Things

SUMMIT & TRAINING

San Francisco, CA  
October 24, 2013

[www.sans.org/event/  
internet-of-things-summit](http://www.sans.org/event/internet-of-things-summit)



## SANS ICS Security Training Washington DC

Washington, DC  
August 12-16, 2013

[www.sans.org/event/  
ics-security-training-washington-dc](http://www.sans.org/event/ics-security-training-washington-dc)



## SANS Chicago 2013

Chicago, IL  
Oct 28 - Nov 2, 2013

[www.sans.org/  
event/chicago-2013](http://www.sans.org/event/chicago-2013)



# Future SANS Training Events

## SANS **South Florida** 2013

Fort Lauderdale, FL  
November 4-9, 2013

[www.sans.org/  
event/sans-south-florida-2013](http://www.sans.org/event/sans-south-florida-2013)

## SANS **Scottsdale** 2014

Scottsdale, AZ  
February 17-24, 2014

[www.sans.org/  
event/scottsdale-2014](http://www.sans.org/event/scottsdale-2014)

## SANS **Pen Test Hackfest** TRAINING EVENT & SUMMIT

Washington, DC  
November 7-14, 2013

[www.sans.org/event/  
pen-test-hack-fest-2013](http://www.sans.org/event/pen-test-hack-fest-2013)

## SANS **Cyber Guardian** 2014

Baltimore, MD  
March 3-10, 2014

[www.sans.org/  
event/cyber-guardian-2014](http://www.sans.org/event/cyber-guardian-2014)

## SANS **San Diego** 2013

San Diego, CA  
November 18-25, 2013

[www.sans.org/  
event/san-diego-2013](http://www.sans.org/event/san-diego-2013)

## SANS **Monterey** 2014

Monterey, CA  
March 6-11, 2014

[www.sans.org/  
event/monterey-2014](http://www.sans.org/event/monterey-2014)

## SANS **San Antonio** 2013

San Antonio, TX  
December 3-8, 2013

[www.sans.org/  
event/san-antonio-2013](http://www.sans.org/event/san-antonio-2013)

## SANS 2014

Orlando, FL  
April 8-14, 2014

[www.sans.org/  
event/sans-2014](http://www.sans.org/event/sans-2014)



## SANS **Cyber Defense Initiative** 2013

Washington, DC  
December 11-19, 2013

[www.sans.org/event/  
cyber-defense-initiative-2013](http://www.sans.org/event/cyber-defense-initiative-2013)

## SANS **Security West** 2014

San Diego, CA  
May 8-15, 2014

[www.sans.org/  
event/security-west-2014](http://www.sans.org/event/security-west-2014)

## SANS **Security East** 2014

New Orleans, LA  
January 18-27, 2014

[www.sans.org/  
event/security-east-2014](http://www.sans.org/event/security-east-2014)

## SANS**FIRE** 2014

Washington, DC  
June 23-30, 2014

[www.sans.org/  
event/sansfire-2014](http://www.sans.org/event/sansfire-2014)



# Network Security 2013 Hotel & Travel Information

## **SANS Network Security 2013 will be located at Caesars Palace**

**3570 Las Vegas Blvd.**

**Las Vegas, NV 89109**

**Phone: 877-427-7243**

**[www.sans.org/event/network-security-2013/location](http://www.sans.org/event/network-security-2013/location)**

The grandest of Las Vegas Hotels, Caesars Palace is famous worldwide for its magnificent beauty and impeccable service. This majestic Las Vegas hotel offers a 129,000 square foot casino, 26 restaurants and cafes, sprawling gardens and pools, a world-class spa, and the renowned Colosseum spotlighting world-class stars.

### **Top five reasons to stay at the Caesars Palace**

- 1** All SANS attendees receive complimentary high-speed Internet when booking in the SANS Block.
- 2** No need to factor in daily cab fees, parking expense and the time associated with travel to alternate hotels.
- 3** By staying at the Caesars Palace, you gain the opportunity to further network with your industry peers and remain in the center of the activity surrounding the conference.
- 4** SANS schedules morning and evening events at the Caesars Palace that you won't want to miss!
- 5** Everything is in one convenient location!

### **Special Rates Available**

The guestroom rate is \$175, but there is a 30% reduction for those who book by August 4, 2013. Government per diem rooms are available with proper ID; you will need to call reservations and ask for the SANS government rate. These rates include high-speed Internet in your room and are only available through August 14, 2013.

To make reservations, please call  
866-227-5944 and ask for the SANS group rate.

**Avis** is proud to offer special rates for SANS Network Security 2013. Make your reservations now and don't forget to use your special discount code: **J945620**  
**[www.avis.com](http://www.avis.com)**

### **Weather Conditions**

September in Las Vegas is pleasant with highs around 95° and lows near 66°. For the latest weather conditions and forecast, please consult **[www.weather.com](http://www.weather.com)**.

# Come to Las Vegas!

Dear Colleagues and Friends,

Network Security 2013 is back in Las Vegas right in the heart of the world famous strip! The city has so much more to offer than gambling and you will find famous attractions, shows, restaurants, and shopping all within walking distance. SANS Network Security 2013 will be offering more classes, night sessions, and vendor events than ever before, including NetWars, our cyber range challenge that is a perfect opportunity for you to test your abilities.

The training event will be back at Caesars Palace ([www.caesarspalace.com](http://www.caesarspalace.com)), which is an attraction in itself!

***If you book by August 4th, we have an additional 30% discount off our already special group rate.*** This property features the Forum Shops with over 160 shops and 14 restaurants. The Garden of the Gods pool complex has just doubled in size. Rod Stewart is the scheduled performer during the dates of our classes with a greatest hits concert that spans over five decades. The hotel also has various dining options from high-end celebrity restaurants and a brand new all-you-can-eat buffet (considered the best in Vegas) to the Market Street Grill, a food court that is quite popular for a quick bite!

Caesars Palace has the largest square footage of any hotel on the strip. ***Since it will take approximately 10 minutes alone to get from the front door to your classroom, we highly recommend staying inside the hotel.*** We also highly recommend you book early since most likely we will not be able to guarantee our special group rate after the deadline. Most guest rooms at Caesars Palace are close to our classrooms, and you won't even need to walk through the casino. *As an extra treat, you will receive complimentary high-speed Internet – but only if you book under the special SANS group rate.*

Even though it will be warm outside, you still want to bring a jacket for the climate-controlled classrooms and cooler evenings. You will also want to check out the SANS Network Security 2013 program guide for all of our events including more *SANS@Night* talks than ever. Please also feel free to send me an e-mail at [Brian@sans.org](mailto:Brian@sans.org) if I can be of any additional assistance to make sure you have the best time possible at SANS Network Security 2013.

*Brian Correia*

Brian Correia

Director, Business Development & Venue Planning

## Five Reasons to Register

### 1. *The best career move you will ever make!*

That's how one SANS alumnus described the IT security education and networking opportunities offered by SANS. Attending SANS Network Security 2013 is a way of investing in your career. To reap the maximum benefit, read the course descriptions carefully. Check out the five- and six-day courses plus a wide variety of one- to four-day skill-based short courses.

### 2. *Why settle for second best?*

If you want to increase your understanding of information security and become more effective in your job, you need to be trained by the best. "SANS provides by far the most in-depth security training with the true experts in the field as instructors," says Mark Smith, Costco Wholesale.

### 3. *Challenge yourself!*

Consider attempting GIAC (Global Information Assurance Certification), the industry's most respected technical security certification. GIAC is the only information security certification for advanced technical subject areas, including audit, intrusion detection, incident handling, firewalls and perimeter protection, forensics, hacker techniques, and Windows and Unix operating system security.

### 4. *Become part of an elite group.*

We're referring to the group of technical, security-savvy professionals who have had hands-on training through SANS. Material taught in the SANS courses directly applies to real-world challenges in your IT environment. "Six days of training gave me six months of work to do," says Steven Marscovetra of Norinchukin Bank. "It is amazing how much of the training I can apply immediately at work."

### 5. *Don't miss out on a good opportunity!*

This is your chance to make a great career move, be taught by the cream of the crop, challenge yourself, and become part of an elite group during a full week of IT security education and networking opportunities. Come prepared to learn; we will come prepared to teach.



# Registration Information

Register online at

[www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)



## How to Register

### 1. To register, go to [www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013).

Select your course or courses and indicate whether you plan to test for GIAC certification. If the course is still open, the secure, online registration server will accept your registration. Sold-out courses will be removed from the online registration. We do not take registrations by phone.

### 2. Provide payment information.

Even if you do not want to submit your payment information online, still complete the online form! There is an option to submit credit card information for payment by fax or phone once the online form is completed and you have your invoice number.

SANS ACCEPTS ONLY U.S. and CANADIAN FEDERAL GOVERNMENT PURCHASE ORDERS

If you normally use a PO and are not part of the federal government, please see our additional PO information on the tuition information page: [www.sans.org/event/network-security-2013/attendee-info](http://www.sans.org/event/network-security-2013/attendee-info)

### 3. Print your invoice.

If you need one, you must print YOUR OWN INVOICE at the end of the online registration process. The invoice will pop up automatically when the registration is successfully submitted. You may also access your invoice at <https://portal.sans.org/history>.

### 4. E-mail confirmation will arrive soon after you register.



To register for a SANS Network Security 2013 Simulcast course, please visit [www.sans.org/simulcast](http://www.sans.org/simulcast)

## Register Early and Save

	DATE	DISCOUNT	DATE	DISCOUNT
Register & pay by	7/31/13	\$500.00	8/14/13	\$250.00

Discount applies to 5- or 6-day courses only.

## Group Savings (Applies to tuition only)

**15% discount** if 12 or more people from the same organization register at the same time

**10% discount** if 8 - 11 people from the same organization register at the same time

**5% discount** if 4 - 7 people from the same organization register at the same time

To obtain a group discount, complete the discount code request form at [www.sans.org/security-training/discounts.php](http://www.sans.org/security-training/discounts.php) prior to registering.



## Get GIAC Certified!

- Only \$579 when combined with SANS training
- Deadline to register at this price is the last day of SANS Network Security 2013
- Price goes to \$799 after deadline
- Register today at [registration@sans.org](mailto:registration@sans.org)

## Frequently Asked Questions

Frequently asked questions about SANS Training and GIAC Certification are posted at [www.giac.org/overview/faq.php](http://www.giac.org/overview/faq.php).

## Cancellation

You may substitute another person in your place at any time by sending an e-mail request to [registration@sans.org](mailto:registration@sans.org) or a fax request to 301-951-0140. Processing fees may apply. No refunds will be given after the stated deadline. Cancellation requests must be received by Wednesday, August 21, 2013, by fax or mail-in order to receive a refund.



Register at [www.sans.org/event/network-security-2013](http://www.sans.org/event/network-security-2013)  
or call 301-654-SANS (7267)

# SANS Network Security 2013 Registration Fees

Register online at [www.sans.org/event/network-security-2013/courses](http://www.sans.org/event/network-security-2013/courses)

If you don't wish to register online, please call 301-654-SANS(7267) 9:00am - 8:00pm (Mon-Fri) EST and we will fax or mail you an order form.

## Job-Based Long Courses

		Paid by 7/31/13	Paid by 8/14/13	Paid after 8/14/13	Add GIAC Cert	Add OnDemand
<input type="checkbox"/> AUD507	Auditing Networks, Perimeters, and Systems .....	\$3,945	\$4,195	\$4,445	<input type="checkbox"/> \$579	
<input type="checkbox"/> DEV522	Defending Web Applications Security Essentials .....	\$3,945	\$4,195	\$4,445	<b>Included</b>	
<input type="checkbox"/> FOR408	Computer Forensic Investigations – Windows In-Depth .....	\$4,345	\$4,595	\$4,845	<input type="checkbox"/> \$579	
<input type="checkbox"/> FOR508	Advanced Computer Forensic Analysis and Incident Response .....	\$4,345	\$4,595	\$4,845	<input type="checkbox"/> \$579	
<input type="checkbox"/> FOR526	Windows Memory Forensics In-Depth <b>NEW!</b> .....	\$3,675	\$3,925	\$4,175		
<input type="checkbox"/> FOR610	Reverse-Engineering Malware: Malware Analysis Tools and Techniques <b>NEW!</b> .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> LEG523	Law of Data Security and Investigations .....	\$3,675	\$3,925	\$4,175	<input type="checkbox"/> \$579	
<input type="checkbox"/> MGT414	SANS® +S™ Training Program for the CISSP® Certification Exam .....	\$3,495	\$3,745	\$3,995	<input type="checkbox"/> \$579	<input type="checkbox"/> \$449
<input type="checkbox"/> MGT512	SANS Security Leadership Essentials For Managers with Knowledge Compression™ .....	\$4,245	\$4,495	\$4,745	<input type="checkbox"/> \$579	<input type="checkbox"/> \$449
<input type="checkbox"/> MGT514	IT Security Strategic Planning, Policy, and Leadership .....	\$3,675	\$3,925	\$4,175		
<input type="checkbox"/> MGT525	IT Project Management, Effective Communication, and PMP® Exam Prep. ....	\$3,945	\$4,195	\$4,445	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC301	Intro to Information Security .....	\$3,675	\$3,925	\$4,175	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC401	Security Essentials Bootcamp Style .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC501	Advanced Security Essentials – Enterprise Defender .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC502	Perimeter Protection In-Depth .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC503	Intrusion Detection In-Depth .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	<input type="checkbox"/> \$449
<input type="checkbox"/> SEC504	Hacker Techniques, Exploits, and Incident Handling .....	\$4,345	\$4,595	\$4,845	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC505	Securing Windows and Resisting Malware <b>NEW!</b> .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC506	Securing Linux/Unix .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC509	Securing Oracle Databases .....	\$3,945	\$4,195	\$4,445		
<input type="checkbox"/> SEC542	Web Application Penetration Testing and Ethical Hacking .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC560	Network Penetration Testing and Ethical Hacking .....	\$4,345	\$4,595	\$4,845	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC561	Hands-On Security Practitioner with NetWars <b>NEW!</b> .....	\$4,995	\$5,245	\$5,495		
<input type="checkbox"/> SEC566	Implementing & Auditing the Twenty Critical Security Controls – In-Depth .....	\$3,675	\$3,925	\$4,175		<input type="checkbox"/> \$449
<input type="checkbox"/> SEC573	Python for Penetration Testers <b>NEW!</b> .....	\$3,675	\$3,925	\$4,175		
<input type="checkbox"/> SEC575	Mobile Device Security and Ethical Hacking .....	\$4,345	\$4,595	\$4,845	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC579	Virtualization and Private Cloud Security .....	\$4,345	\$4,595	\$4,845		
<input type="checkbox"/> SEC617	Wireless Ethical Hacking, Penetration Testing, and Defenses .....	\$4,145	\$4,395	\$4,645	<input type="checkbox"/> \$579	
<input type="checkbox"/> SEC660	Advanced Penetration Testing, Exploits, and Ethical Hacking .....	\$4,345	\$4,595	\$4,845	<input type="checkbox"/> \$579	
<input type="checkbox"/> HOSTED	(ISC)® Certified Secure Software Lifecycle Professional (CSSLP®) CBK® Education Program .....	\$3,145	\$3,145	\$3,145		
<input type="checkbox"/> HOSTED	Social Engineering For Pentesters <b>NEW!</b> .....	\$4,175	\$4,175	\$4,175		
<input type="checkbox"/> HOSTED	Critical Infrastructure and Control System Cybersecurity .....	\$4,375	\$4,375	\$4,375		
<input type="checkbox"/> HOSTED	Pentesting ICS and Smart Grid .....	\$4,175	\$4,175	\$4,175		
<input type="checkbox"/> HOSTED	SCADA Security Training .....	\$4,175	\$4,175	\$4,175		

## Skill-Based Short Courses

			If taking a 5-6 day course				
<input type="checkbox"/>	Assembly Language Fundamentals of Penetration Testing & Reversing <b>NEW!</b> .....	\$1,250	\$1,800	\$1,800	\$1,800		
<input type="checkbox"/> AUD444	Auditing Security and Controls of Active Directory and Windows <b>NEW!</b> .....	N/A	\$2,400	\$2,400	\$2,400		
<input type="checkbox"/> DEV541	Secure Coding in Java/JEE: Developing Defensible Applications .....	N/A	\$3,275	\$3,525	\$3,775	<b>Included</b>	<input type="checkbox"/> \$449
<input type="checkbox"/> DEV544	Secure Coding in .NET: Developing Defensible Applications .....	N/A	\$3,275	\$3,525	\$3,775	<b>Included</b>	
<input type="checkbox"/> MGT305	Technical Communication and Presentation Skills for Security Professionals .....	\$575	\$1,045	\$1,045	\$1,045		
<input type="checkbox"/> MGT433	Securing The Human: Building and Deploying an Effective Security Awareness Program .....	\$1,250	\$1,800	\$1,800	\$1,800		
<input type="checkbox"/> MGT535	Incident Response Team Management .....	\$575	\$1,045	\$1,045	\$1,045		
<input type="checkbox"/> SEC434	Log Management In-Depth: Compliance, Security, Forensics, and Troubleshooting .....	\$1,350	\$2,045	\$2,045	\$2,045		
<input type="checkbox"/> SEC524	Cloud Security Fundamentals .....	\$1,250	\$1,800	\$1,800	\$1,800		
<input type="checkbox"/> SEC546	IPv6 Essentials .....	\$1,250	\$1,800	\$1,800	\$1,800		
<input type="checkbox"/> SEC580	Metasploit Kung Fu for Enterprise Pen Testing .....	\$1,250	\$1,800	\$1,800	\$1,800		
<input type="checkbox"/> HOSTED	Onapsis: Securing the SAP Platform <b>NEW!</b> .....	N/A	\$1,900	\$1,900	\$1,900		
<input type="checkbox"/> HOSTED	Offensive Countermeasures: The Art of Active Defenses .....	N/A	\$1,700	\$1,700	\$1,700		
<input type="checkbox"/> HOSTED	Physical Penetration Testing - Introduction .....	N/A	\$1,900	\$1,900	\$1,900		
<input type="checkbox"/> SPECIAL	NetWars – Tournament Entrance Fee .....	FREE	\$1,249	\$1,249	\$1,249		

## Individual Courses Available

	MON 9/16	TUE 9/17	WED 9/18	THU 9/19	FRI 9/20	SAT 9/21
AUD507	<input type="checkbox"/> 507.1	<input type="checkbox"/> 507.2 & 507.3		<input type="checkbox"/> 507.4	<input type="checkbox"/> 507.5	<input type="checkbox"/> 507.6
LEG523		<input type="checkbox"/> 523.1	<input type="checkbox"/> 523.2	<input type="checkbox"/> 523.3	<input type="checkbox"/> 523.4	<input type="checkbox"/> 523.5
SEC301	<input type="checkbox"/> 301.1	<input type="checkbox"/> 301.2	<input type="checkbox"/> 301.3	<input type="checkbox"/> 301.4	<input type="checkbox"/> 301.5	
SEC401	<input type="checkbox"/> 401.1	<input type="checkbox"/> 401.2	<input type="checkbox"/> 401.3	<input type="checkbox"/> 401.4	<input type="checkbox"/> 401.5	<input type="checkbox"/> 401.6
SEC501	<input type="checkbox"/> 501.1	<input type="checkbox"/> 501.2	<input type="checkbox"/> 501.3	<input type="checkbox"/> 501.4	<input type="checkbox"/> 501.5	<input type="checkbox"/> 501.6
SEC502	<input type="checkbox"/> 502.1	<input type="checkbox"/> 502.2	<input type="checkbox"/> 502.3	<input type="checkbox"/> 502.4	<input type="checkbox"/> 502.5	<input type="checkbox"/> 502.6
SEC503	<input type="checkbox"/> 503.1					
SEC504	<input type="checkbox"/> 504.1					
SEC505	<input type="checkbox"/> 505.1	<input type="checkbox"/> 505.2	<input type="checkbox"/> 505.3	<input type="checkbox"/> 505.4	<input type="checkbox"/> 505.5	<input type="checkbox"/> 505.6

## Individual Course Day Rates If Not Taking a Full Course

<input type="checkbox"/> One Full Day .....	\$1,350
<input type="checkbox"/> Two Full Days .....	\$2,075
<input type="checkbox"/> Three Full Days .....	\$3,025
<input type="checkbox"/> Four Full Days .....	\$3,775
<input type="checkbox"/> Five Full Days .....	\$4,575
<input type="checkbox"/> Six Full Days .....	\$4,875
<input type="checkbox"/> Seven Full Days .....	\$5,475
<input type="checkbox"/> Eight Full Days .....	\$5,995

**RE M I N D E R : When you register, please use the promo code located on the back cover.**



SANS is the most trusted and by far the largest source for information security training, certification, and research in the world.

## Five Tips to Get Approval for SANS Training

### 1. EXPLORE

- Read this brochure and note the courses that will enhance your role at your organization.
- Use the *Career Roadmap* (inside cover) to arm yourself with all the necessary materials to make a good case for attending a SANS training event.
- Note that the core, job-based courses can be complemented by short, skill-based courses of one or two days. We also offer deep discounts for bundled course packages. Consider a *GIAC Certification*, which will show the world that you have achieved proven expertise in your chosen field.

### 2. RELATE

- Show how recent problems or issues will be solved with the knowledge you gain from the SANS course.
- Promise to share what you've learned with your colleagues.

### 3. SAVE

- The earlier you sign up, the more you save, so explain the benefit of signing up early.
- Save even more with group discounts! See inside for details.



Scan the QR code and  
register by July 31st to  
**SAVE \$500**  
on Network Security courses.

[www.sans.org/info/129555](http://www.sans.org/info/129555)

### 4. ADD VALUE

- Share with your boss that you can add value to your enterprise by meeting with network security experts – people who face the same type of challenges that you face every single day.
- Explain how you will be able to get and share great ideas on improving your IT productivity and efficiency.
- Enhance your SANS training experience with *SANS @Night* talks and the *Vendor Expo*, which are free and only available at live training events.
- Take advantage of the special SANS host-hotel rate so you will be right where the action is!

### 5. ACT

- With the fortitude and initiative you have demonstrated thus far, you can confidently seek approval to attend SANS training!

**Return on Investment:** SANS training events are recognized as the best place in the world to get information security education. With SANS, you will gain significant return on your InfoSec investment. Through our intensive immersion classes, our training is designed to help your staff master the practical steps necessary for defending systems and networks against the most dangerous threats – the ones being actively exploited.

**Remember:** SANS is your first and best choice for information and software security training. The SANS Promise is *"You will be able to apply our information security training the day you get back to the office!"*