SANS

The Most Trusted Name in Information and Software Security Training

2016

Orlando, FL

March 12-21, 2016

Our most comprehensive information security training event of the year...with something for everyone!

NEW! **Active Defense, Offensive Countermeasures & Cyber Deception**

NEW! **Cyber Threat Intelligence**

NEW! **Network Penetration Testing and Ethical Hacking**

Security Essentials Bootcamp Style

Hacker Tools, Techniques, Exploits, and Incident Handling

Windows Forensic Analysis

Web App Penetration Testing and Ethical Hacking

And more than 30 additional courses on network and software security, forensics, software development, legal, management, and IT audit.

SANS 2016 will be held at the

Walt Disney World Swan and Dolphin Resort

Save $400 by paying early!
See page 80 for more details.

"You're getting training from instructors who do this stuff for a living and not from someone who just teaches."

-Scott Avvento, Alpine Cyber Solutions, LCC

GIAC Approved Training

Register at

sans.org/sans-2016

Dear Colleagues,


Dr. Eric Cole

It is time we unite, join forces, and show that if we work together we can make a measurable difference in security. It is my pleasure to announce that **SANS 2016** is back in Orlando, Florida from March 12-21 with cutting-edge courses taught by top industry professionals who will provide you with the best available cybersecurity training. I invite you to take this amazing opportunity to meet with other cybersecurity professionals at one of the largest SANS events and learn actionable steps that will make an impact on security. Our event campus and lodging will once again be the magnificent **Walt Disney World Dolphin Resort**.

I'm saddened to see the number of organizations struggling with security and ultimately getting breached. Many people may feel protecting their information and infrastructure is a losing battle. In fact, however, our efforts are anything *but* a losing battle. Much of the problem is that organizations and people have not been given proper guidance and direction. Imagine if you played soccer your entire life, and then, without warning, you were placed on a U.S. football team. Consider the fear and frustration you would experience during your first game. You would be confused, and might give up. You did nothing wrong, but the rules of the game changed and no one told you. This is exactly what has happened with cybersecurity. Cybersecurity significantly changed many years ago, but entities are still using the old playbook and it is not working. My personal goals for SANS 2016 are to demonstrate how you can win at security and teach you specific techniques that will improve your security skills. At this training event you will develop a customized playbook that allows you to tackle your cybersecurity needs.

More than 35 information security courses will be taught by SANS' top instructors and many of those courses can prepare you for a prestigious GIAC certification. There will be numerous opportunities to learn new skills, techniques, and trends at the SANS@Night talks, vendor expo, lunch-and-learn sessions, and by networking with your peers. You'll hear about the latest and most important issues facing your profession, from SANS practitioners who are leading the global conversation on cybersecurity.

I hope you can join me at SANS 2016 for these many exciting opportunities. Please visit **sans.org/sans-2016** to review the full course list and conference details. Register and pay soon to receive an early-bird discount!

I look forward to seeing you in Orlando for SANS 2016!

Dr. Eric Cole
SANS Fellow
sans.org/sans-2016

Information Security

Information security professionals are responsible for research and analysis of security threats that may affect an organization's assets, products, or technical specifications. These security professionals will dig deeper into technical protocols and specifications related to security threats than most of their peers, identifying strategies to defend against attacks by gaining an intimate knowledge of the threats.

SAMPLE JOB TITLES
- Cybersecurity analyst
- Cybersecurity engineer
- Cybersecurity architect

CORE COURSES

TECHNICAL INTRODUCTORY	CORE	IN-DEPTH
SEC301 Intro to Information Security **GISF**	→ **SEC401** Security Essentials Bootcamp Style **GSEC**	→ **SEC501** Advanced Security Essentials – Enterprise Defender **GCED**

Penetration Testing/Vulnerability Assessment

CORE COURSES SEC301 (GISF) ▸ SEC401 (GSEC)

→ **SEC504** Hacker Tools, Techniques, Exploits, and Incident Handling **GCIH**

NETWORK & EXPLOITS	WEB	LAB-CENTERED	MOBILE/WIRELESS
SEC560 Network Penetration Testing and Ethical Hacking **GPEN**	**SEC542** Web App Penetration Testing and Ethical Hacking **GWAPT**	**SEC561** Immersive Hands-on Hacking Techniques	**SEC575** Mobile Device Security and Ethical Hacking **GMOB**
SEC660 Advanced Penetration Testing, Exploit Writing, and Ethical Hacking **GXPN**	**SEC642** Advanced Web App Penetration Testing and Ethical Hacking	**SEC562** CyberCity Hands-on Kinetic Cyber Range Exercise	**SEC617** Wireless Ethical Hacking, Penetration Testing & Defenses **GAWN**
SEC760 Advanced Exploit Development for Penetration Testers			

SPECIALIZATION

SEC573 Python for Penetration Testers

SEC580 Metasploit Kung Fu for Enterprise Pen Testing

Because offense must inform defense, these experts provide enormous value to an organization by applying attack techniques to find security vulnerabilities, analyze their business risk implications, write modern exploits, and recommend mitigations before those vulnerabilities are exploited by real-world attackers.

SAMPLE JOB TITLES
- Penetration tester
- Vulnerability assessor
- Ethical hacker
- Red/Blue team member
- Cyberspace engineer

Risk and Compliance/Auditing/Governance

SEC566 Implementing and Auditing the Critical Security Controls – In-Depth **GCCC**

AUD507 Auditing & Monitoring Networks, Perimeters, and Systems **GSNA**

These experts assess and report risks to the organization by measuring compliance with policies, procedures, and standards. They recommend improvements to make the organization more efficient and profitable through continuous monitoring of risk management.

SAMPLE JOB TITLES
- Auditor
- Compliance officer

Security Operations Center/Intrusion Detection

SAMPLE JOB TITLES
- Intrusion detection analyst
- Security Operations Center analyst/engineer
- CERT member
- Cyber threat analyst

CORE COURSES
SEC301 (GISF) ▸ SEC401 (GSEC)

SEC504
Hacker Tools, Techniques, Exploits, and Incident Handling
GCIH

The Security Operations Center (SOC) is the focal point for safeguarding against cyber-related incidents, monitoring security, and protecting assets of the enterprise network and endpoints. SOC analysts are responsible for enterprise situational awareness and continuous surveillance, including monitoring traffic, blocking unwanted traffic to and from the Internet, and detecting any type of attack. Point solution security technologies are the starting point for hardening the network against possible intrusion attempts.

ENDPOINT MONITORING

SEC501
Advanced Security Essentials – Enterprise Defender
GCED

FOR508
Advanced Digital Forensics and Incident Response
GCFA

NETWORK MONITORING

SEC502
Perimeter Protection In-Depth
GPPA

SEC503
Intrusion Detection In-Depth
GCIA

FOR572
Advanced Network Forensics and Analysis
GNFA

SEC511
Continuous Monitoring and Security Operations
GMON

SEC550
Active Defense, Offensive Countermeasures, and Cyber Deception

THREAT INTELLIGENCE

FOR578
Cyber Threat Intelligence

Network Operations Center, System Admin, Security Architecture

SAMPLE JOB TITLES
- System/IT administrator
- Security administrator
- Security architect/engineer

A Network Operations Center (NOC) is where IT professionals supervise, monitor, and maintain the enterprise network. The NOC is the focal point for network troubleshooting, software distribution and updating, router and system management, performance monitoring, and coordination with affiliated networks. The NOC analysts work hand-in-hand with the Security Operations Center, which safeguards the enterprise and continuously monitors threats against it.

CORE COURSES
SEC301 (GISF) ▸ SEC401 (GSEC) ▸ SEC501 (GCED)

SEC505
Securing Windows with PowerShell and the Critical Security Controls
GCWN

SEC506
Securing Linux/Unix
GCUX

SEC566
Implementing and Auditing the Critical Security Controls – In-Depth
GCCC

SEC579
Virtualization and Private Cloud Security

Development – Secure Development

Securing the Human for Developers – STH.Developer
Application Security Awareness Modules

DEV522
Defending Web Applications Security Essentials
GWEB

DEV541
Secure Coding in Java/JEE: Developing Defensible Applications
GSSP-JAVA

DEV544
Secure Coding in .NET: Developing Defensible Applications
GSSP-.NET

SAMPLE JOB TITLES
- Developer
- Software architect
- QA tester
- Development manager

The security-savvy software developer leads all developers in creating secure software and implementing secure programming techniques that are free from logical design and technical implementation flaws. This expert is ultimately responsible for ensuring customer software is free from vulnerabilities that can be exploited by an attacker.

SPECIALIZATION

SEC542
Web App Penetration Testing and Ethical Hacking
GWAPT

SEC642
Advanced Web App Penetration Testing and Ethical Hacking

Industrial Control Systems

ICS-focused courses are designed to equip both security professionals and control system engineers with the knowledge and skills they need to safeguard critical infrastructure.

SAMPLE JOB TITLES
- IT & OT support staff
- IT & OT cybersecurity
- ICS engineer

ICS410
ICS/SCADA Security Essentials
GICSP

ICS515
ICS Active Defense and Incident Response

HOSTED
Assessing and Exploiting Control Systems

HOSTED
Critical Infrastructure and Control System Cybersecurity

Cyber or IT Security Management

FOUNDATIONAL

MGT512 SANS Security Leadership Essentials For Managers with Knowledge Compression™ **GSLC**

MGT525 IT Project Management, Effective Communication, and PMP® Exam Prep **GCPM**

MGT414 SANS Training Program for CISSP® Certification **GISP**

CORE

MGT514 IT Security Strategic Planning, Policy, and Leadership

MGT535 Incident Response Team Management

LEG523 Law of Data Security and Investigations **GLEG**

SPECIALIZATION

MGT433 Securing The Human: How to Build, Maintain & Measure a High-Impact Awareness Program

AUD507 Auditing & Monitoring Networks, Perimeters, and Systems **GSNA**

HOSTED Health Care Security Essentials

SAMPLE JOB TITLES

- CISO
- Cybersecurity manager/officer
- Security director

Management of people, processes, and technologies is critical for maintaining proactive enterprise situational awareness and for the ongoing success of continuous monitoring efforts. These managers must have the leadership skills, current knowledge, and best practice examples to make timely and effective decisions that benefit the entire enterprise information infrastructure.

Incident Response

When the security of a system or network has been compromised, the incident responder is the first-line defense during the breach. The responders not only have to be technically astute, they must be able to handle stress under fire while navigating people, processes, and technology to help respond to and mitigate a security incident.

CORE COURSES SEC301 (GISF) ▸ SEC401 (GSEC)

SEC504 Hacker Tools, Techniques, Exploits, and Incident Handling **GCIH**

SPECIALIZATION

FOR526 Memory Forensics In-Depth

MGT535 Incident Response Team Management

NETWORK ANALYSIS

SEC503 Intrusion Detection In-Depth **GCIA**

FOR572 Advanced Network Forensics and Analysis **GNFA**

ENDPOINT ANALYSIS

FOR408 Windows Forensic Analysis **GCFE**

FOR508 Advanced Digital Forensics and Incident Response **GCFA**

MALWARE ANALYSIS

FOR610 Reverse-Engineering Malware: Malware Analysis Tools and Techniques **GREM**

SAMPLE JOB TITLES

- Security analyst/engineer
- SOC analyst
- Cyber threat analyst
- CERT member
- Malware analyst

Digital Forensic Investigations and Media Exploitation

FOR408 Windows Forensic Analysis **GCFE**

SEC504 Hacker Tools, Techniques, Exploits, and Incident Handling **GCIH**

FOR508 Advanced Digital Forensics and Incident Response **GCFA**

FOR585 Advanced Smartphone Forensics

FOR518 Mac Forensic Analysis

FOR526 Memory Forensics In-Depth

FOR610 Reverse-Engineering Malware: Malware Analysis Tools and Techniques **GREM**

SAMPLE JOB TITLES

- Computer crime investigator
- Law enforcement
- Digital investigations analyst
- Media exploitation analyst
- Information technology litigation support and consultant
- Insider threat analyst

With today's ever-changing technologies and environments, it is inevitable that every organization will deal with cyber crime, including fraud, insider threats, industrial espionage, and phishing. Government organizations also need skilled personnel to perform media exploitation and recover key intelligence available on adversary systems. To help solve these challenges, organizations are hiring digital forensic professionals and relying on cyber crime law enforcement agents to piece together a comprehensive account of what happened.

Participate in either the CORE or DFIR NetWars Tournament at SANS 2016 for FREE!

NETWARS

CORE NETWARS TOURNAMENT

DFIR NETWARS TOURNAMENT

CORE NetWars

The CORE NetWars Tournament 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. Many enterprises, government agencies, and military bases are using NetWars to help identify skilled personnel and as part of extensive hands-on training. With CORE NetWars, you'll build a wide variety of skills while having a great time.

Who Should Attend

- Security professionals
- System administrators
- Network administrators
- Ethical hackers
- Penetration testers
- Incident handlers
- Security auditors
- Vulnerability assessment personnel
- Security Operations Center staff

In-Depth, Hands-On InfoSec Skills – Embrace the Challenge – CORE NetWars

DFIR NetWars

The DFIR NetWars Tournament is an incident simulator packed with a vast amount of forensic and incident response challenges covering host forensics, network forensics, and malware and memory analysis. It is developed by incident responders and analysts who use these skills daily to stop data breaches and solve crimes. Sharpen your team's skills prior to being involved in a real incident.

Who Should Attend

- Digital forensic analysts
- Forensic examiners
- Reverse-engineering and malware analysts
- Incident responders
- Law enforcement officers, federal agents, or detectives
- Security Operations Center analysts
- Cyber crime investigators
- Media exploitation analysts

Challenge Yourself Before the Enemy Does – DFIR NetWars

Both NetWars competitions will be played over two evenings: March 17-18

Prizes will be awarded at the conclusion of the games.

REGISTRATION IS LIMITED AND IS FREE

for students attending any long course at SANS 2016 *(NON-STUDENT ENTRANCE FEE IS $1,450).*

Register at sans.org/event/sans-2016/courses

Courses-at-a-Glance

For an up-to-date course list please check the website at sans.org/event/sans-2016/schedule

		SAT 3/12	SUN 3-13	MON 3-14	TUE 3-15	WED 3-16	THU 3-17	FRI 3/18	SAT 3-19	SUN 3-20	MON 3-21
SEC301	Intro to Information Security			PAGE 8							
SEC401	Security Essentials Bootcamp Style *SIMULCAST*			PAGE 10							
SEC440	Critical Security Controls: Planning, Implementing and Auditing									P 67	
SEC501	Advanced Security Essentials – Enterprise Defender			PAGE 12							
SEC503	Intrusion Detection In-Depth			PAGE 14							
SEC504	Hacker Tools, Techniques, Exploits, and Incident Handling			PAGE 16							
SEC505	Securing Windows with PowerShell and the Critical Security Controls *SIMULCAST*			PAGE 18							
SEC511	Continuous Monitoring and Security Operations *SIMULCAST*			PAGE 20							
SEC524	Cloud Security Fundamentals									P 67	
SEC542	Web App Penetration Testing and Ethical Hacking *SIMULCAST*			PAGE 22							
SEC550	Active Defense, Offensive Countermeasures, and Cyber Deception NEW!			PAGE 7							
SEC560	Network Penetration Testing and Ethical Hacking NEW! *SIMULCAST*			PAGE 24							
SEC561	Immersive Hands-On Hacking Techniques			PAGE 26							
SEC566	Implementing and Auditing the Critical Security Controls – In-Depth			PAGE 28							
SEC575	Mobile Device Security and Ethical Hacking			PAGE 30							
SEC579	Virtualization and Private Cloud Security			PAGE 32							
SEC580	Metasploit Kung Fu for Enterprise Pen Testing									P 68	
SEC660	Advanced Penetration Testing, Exploit Writing, and Ethical Hacking			PAGE 34							
FOR408	Windows Forensic Analysis *SIMULCAST*			PAGE 36							
FOR508	Advanced Digital Forensics and Incident Response			PAGE 38							
FOR572	Advanced Network Forensics and Analysis			PAGE 40							
FOR578	Cyber Threat Intelligence NEW!			PAGE 42							
FOR585	Advanced Smartphone Forensics			PAGE 44							
FOR610	Reverse-Engineering Malware: Malware Analysis Tools and Techniques			PAGE 46							
MGT305	Technical Communication and Presentation Skills for Security Professionals		P 68								
MGT414	SANS Training Program for CISSP® Certification			PAGE 48							
MGT415	A Practical Introduction to Cyber Security Risk Management NEW!	P 69									
MGT433	Securing The Human: How to Build, Maintain, and Measure a High-Impact Awareness Program *SIMULCAST*	P 69									
MGT512	SANS Security Leadership Essentials for Managers with Knowledge Compression™			PAGE 50							
MGT514	IT Security Strategic Planning, Policy, and Leadership			PAGE 52							
MGT525	IT Project Management, Effective Communication, and PMP® Exam Prep			PAGE 54							
MGT535	Incident Response Team Management	P 69									
AUD507	Auditing & Monitoring Networks, Perimeters, and Systems			PAGE 56							
DEV522	Defending Web Applications Security Essentials			PAGE 58							
DEV541	Secure Coding in Java/JEE: Developing Defensible Applications	PAGE 60									
DEV544	Secure Coding in .NET: Developing Defensible Applications					PAGE 61					
ICS410	ICS/SCADA Security Essentials			PAGE 62							
LEG523	Law of Data Security and Investigations			PAGE 64							
HOSTED	Health Care Security Essentials NEW!	P 66									
HOSTED	Physical Penetration Testing									P 66	
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At SANS, we are privileged to have an instructor corps considered to be the best in the world. Not only do our instructors meet SANS' stringent requirements for excellence, they are all real-world practitioners. What you learn in class will be up-to-date and relevant to your job.

Dr. Eric Cole

Fellow
@drericcole
SEC401

"Dr. Cole's passion for the topic, depth of knowledge, and teaching style make a vast subject area easily understood."

-Duane Shenberger, Shenberger Tech

Eric Conrad

Senior Instructor
@eric_conrad
SEC542 & SEC580

"Eric is a great instructor and I plan to take future classes that he teaches!"

-Jason Thompson, North Island Credit Union

Jason Fossen

Fellow
@JasonFossen
SEC505

"Jason Fossen's Windows expertise is a clear asset to the SANS team!"

-Ernie H., U.S. Navy

Bryce Galbraith

Principal
@brycegalbraith
SEC550

"Bryce is an excellent instructor. His knowledge and delivery are exceptional."

-Chris Shipp, DM Petroleum Operations Co.

Paul A. Henry

Senior Instructor
@phenrycissp
SEC501 & SEC524

"Paul was great and shared so much of his experience with us during the class which helps solidify the concepts."

-Stephanie Padilla, Intel Security

David Hoelzer

Fellow
@it_audit
AUD507 & MGT305

"David was awesome, very interactive, and engaging."

-Christopher Hills, Charles Schwab

Rob Lee

Fellow
@robtlee @sansforensics
FOR508

"Rob Lee takes forensics to the highest level. It's not just about forensics, it's about forensic methodically."

-Thomas C., Army Cyber Institute

Heather Mahalik

Senior Instructor
@HeatherMahalik
FOR585

"Heather is a great instructor. The only downside will be not being able to bring her back to my office so we can pick her brain every day!"

-C. McCollom, Clark County Sheriff's Office

Seth Misenar
Senior Instructor
@sethmisenar
SEC511

"Seth did an amazing job presenting the course material. He is very passionate about security and it shows."
-James Harding, WEMS

Mike Poor
Senior Instructor
@Mike_Poor
SEC503

"Mike is outstanding! Many claim to have the background he does when they don't. It's nice to learn from a pro!"
-Jeremy Glass, Molina Healthcare

Dave Shackleford
Senior Instructor
@daveshackleford
SEC579

"Real-world tools and examples from a real-world professional. Dave is an absolute subject-matter expert!"
-Harry Lohse, Centric Group

Stephen Sims
Senior Instructor
@Steph3nSims
SEC660

"Stephen is an excellent instructor. It's very rare to find an instructor who is so adept yet still makes the material approachable."
-Don Bailey, Blackbird Technologies

Ed Skoudis
Fellow
@edskoudis
SEC560

"Ed is one of the best instructors I have ever had. It's no secret why he is such a world-class pen tester!"
-Patrick McCoy, KEYW Corporation

John Strand
Senior Instructor
@strandjs
SEC504

"John Strand opened my eyes and helped me understand how to approach the concepts of offensive security and incident handling. He is one of the very best."
-Stephen Ellis, CB&I

James Tarala
Senior Instructor
@isaudit
SEC566 & MGT415

"James is an amazing presenter, fun to listen to on top of being very knowledgeable."
-Mike Pildher, URS Corp

Chad Tilbury
Senior Instructor
@chadtilbury
FOR408

"The best educator I have ever learned from. His knowledge and presentation are superb."
-R. Ross, FDA

Johannes Ullrich, PhD
Senior Instructor
@johullrich
DEV522

"Johannes has an excellent teaching style, very knowledgeable, listens to questions, and will keep explaining with different examples until you understand."
-Lori Stockdale, NYISO

Benjamin Wright
Senior Instructor
@benjaminwright
LEG523

"Benjamin Wright knows the material very well. He has excellent flow and is right on target with the course description."
-Sharon O'Bryan, DeVry Inc.

Joshua Wright
Senior Instructor
@joswr1ght
SEC575

"Joshua is very knowledgeable and is great presenting the material."
-Tara Larson, Medtronic

Lenny Zeltser
Senior Instructor
@lennyzeltser
FOR610

"Lenny is a great instructor. He is patient, precise, quick to help, and motivating. Thanks! "
-Joona Airamo, StoneSoft

The Value of SANS Training and *YOU*

EXPLORE

- Read this brochure and note the courses that will enhance your role in your organization
- Use the *Career Roadmap* in this brochure (sans.org/media/security-training/roadmap.pdf) to plan your growth in your chosen career path

RELATE

- Consider how security needs in your workplace will be met with the knowledge you'll gain in a SANS course
- Know that the education you receive will make you an expert resource for your team

VALIDATE

- Pursue a GIAC Certification after your training to validate your new expertise
- Add a NetWars challenge to your SANS experience to prove your hands-on skills

SAVE

- Register early to pay less using early-bird specials
- Consider group discounts or bundled course packages to make the most of your training budget

ADD VALUE

- Network with fellow security experts in your industry
- Prepare thoughts and questions before arriving to share with the group
- Attend SANS@Night talks and activities to gain even more knowledge and experience from instructors and peers alike

ALTERNATIVES

- If you cannot attend a live training event in person, attend the courses virtually via SANS Simulcast
- Use SANS OnDemand or vLive to complete the same training online from anywhere in the world, at any time

ACT

- Bring the value of SANS training to your career and organization by registering for a course today, or contact us at 301-654-SANS with further questions

Return on Investment

SANS live training is recognized as the best resource in the world for information security education. With SANS, you gain significant returns 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

the SANS promise:

You will be able to apply our information security training the day you get back to the office!

SEC550 Active Defense, Offensive Countermeasures & Cyber Deception

SANS

NEW!

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 5:00pm
Laptop Required
30 CPEs
Instructor: Bryce Galbraith

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. You may be able to immediately implement some of the measures we discuss in this course, while others may take a while. Either way, consider what we discuss as a collection of tools that will be at your disposal when you need them to annoy attackers, determine who is attacking you, and, finally, attack the attackers.

Who Should Attend

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

You Will Learn:

- How to force an attacker to take more moves to attack your network – moves that in turn may increase your ability to detect that attacker
- How to gain better attribution as to who is attacking you and why
- How to gain access to a bad guy's system
- Most importantly, you will find out how to do the above legally

SEC550: Active Defense, Offensive Countermeasures, and Cyber Deception is based on the Active Defense Harbinger Distribution live Linux environment funded by the Defense Advanced Research Projects Agency (DARPA). This virtual machine is built from the ground up for defenders to quickly implement Active Defenses in their environments. The course is very heavy with hands-on activities – we won't just talk about Active Defenses, we will work through labs that will enable you to quickly and easily implement what you learn in your own working environment.

You Will Be Able To

- Track bad guys with callback Word documents
- Use Honeybadger to track web attackers
- Block attackers from successfully attacking servers with honeyports
- Block web attackers from automatically discovering pages and input fields
- Understand the legal limits and restrictions of Active Defense
- Obfuscate DNS entries
- Create non-attributable Active Defense Servers
- Combine geolocation with existing Java applications
- Create online social media profiles for cyber deception
- Easily create and deploy honeypots

"It's hard to imagine a better instructor than Bryce. He is obviously very skilled and experienced – his teaching skill and personality is a perfect fit."
-Patrick Gustafson, Allianz Life Insurance

What You Will Receive

- A fully functioning Active Defense Harbinger Distribution ready to deploy
- Class books and a DVD with the necessary tools and the OCM virtual machine, which is a fully functional Linux system with the OCM tools installed and ready to go for the class and for the students' work environments

Bryce Galbraith *SANS Principal Instructor*

As a contributing author of 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 he 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 provides 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, holds several security certifications, and speaks at conferences around the world. @brycegalbraith

SEC301 Intro to Information Security

SANS

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 5:00pm
Laptop Required
30 CPEs
Instructor: Keith Palmgren

giac.org

BUNDLE ONDEMAND
WITH THIS COURSE
sans.org/ondemand

To determine if the SANS SEC301 course is right for you, ask yourself five simple questions:

- Are you new to information security and in need of an introduction to the fundamentals?
- Are you bombarded with complex technical security terms that you don't understand?
- Are you a non-IT security manager who lays awake at night worrying that your company will be the next mega-breach headline story on the 6 o'clock news?
- Do you need to be conversant in basic security concepts, principles, and terms, even if you don't need "deep in the weeds" detail?
- Have you decided to make a career change to take advantage of the job opportunities in information security and need formal training/certification?

If you answer yes to any of these questions, the **SEC301: Intro to Information Security** training course is for you. Jump-start your security knowledge by receiving insight and instruction from real-world security experts on critical introductory topics that are fundamental to information security. This completely revised five-day comprehensive course covers everything from core terminology to the basics of computer networks, security policies, incident response, passwords, and even an introduction to cryptographic principles.

This course is designed for students who have no prior knowledge of security and limited knowledge of technology. The hands-on, step-by-step teaching approach will enable you to grasp all of the information presented even if some of the topics are new to you. You'll learn the fundamentals of information security that will serve as the foundation of your InfoSec skills and knowledge for years to come.

Written by a security professional with over 30 years of experience in both the public and private sectors, SEC301 provides uncompromising real-world insight from start to finish. The course prepares you for the Global Information Security Fundamentals (GISF) certification test, as well as for the next course up the line, **SEC401: Security Essentials Bootcamp Style**. It also delivers on the SANS promise: ***You will be able to use the knowledge and skills you learn in SEC301 as soon as you return to work.***

"I very much appreciate the passion of the instructors. Their knowledge is incredible and the presentation of their knowledge is down-to-earth and helpful. SANS training is far better than privacy-related certification."
-Ron Hoffman, Mutual of Omaha

Keith Palmgren *SANS Certified Instructor*

Keith Palmgren is an IT ecurity professional with over 30 years of experience specializing in the field. He began his career with the U.S. Air Force working with cryptographic keys and codes management. He also worked in what was at the time the newly-formed Air Force computer security department. Following the Air Force, Keith worked as an MIS director for a small company before joining AT&T/Lucent as a Senior Security Architect working on engagements with the DoD and the National Security Agency. Later, as Security Consulting Practice Manager for both Sprint and Netigy, Keith built and ran the security consulting practice. He was responsible for all security consulting world-wide and for leading dozens of security professionals on many consulting engagements across all business spectrums. For the last several years, Keith has run his own company, NetIP, Inc. He divides his time between consulting, training, and freelance writing projects. In his career, Keith has trained over 10,000 IT professionals and authored more than 20 IT security training courses including the SANS SEC301 course. Keith currently holds 10 computer security certifications (CISSP, GSEC, GCIH, GCED, GISF, CEH, Security+, Network+, A+, CTT+). @kpalmgren

301.1 HANDS ON: The Cornerstone of Security

Every good security practitioner and every good security program begins with the same mantra: learn the fundamentals. SEC301 starts by instilling familiarity with core security terms and principles. By the time you leave the classroom after the first day, you will fully understand the Principle of Least Privilege and the Confidentiality, Integrity, and Availability (CIA) Triad, and you'll see why those principles drive all security discussions. You will be conversant in the fundamentals of risk management, security policy, authentication/authorization/accountability, and security awareness training.

301.2 HANDS ON: Cryptography & Wireless Security

Cryptography is one of the most complex issues faced by security practitioners. It is not a topic you can explain in passing, so we will spend some time on it. Not to worry, we won't take you through the math behind cryptography, but we'll look at basic crypto terminology and processes. What is steganography? What is substitution and transposition? What is a "work factor" in cryptography and why does it matter? What do we mean by symmetric and asymmetric key cryptography and "cryptographic hash," and why do you need to know? How are those concepts used together in the real world to create cryptographic systems? Finally, we take a brief look at several cryptographic applications. We won't get into the details of how Secure Shell (SSH) actually works, but you will leave the classroom knowing what that term means and what SSH is used for. In other words, you'll be able to discuss several crypto applications in a general sense and not be confused when someone brings them up. Following cryptography, we introduce the fundamentals of wireless security (WiFi and Bluetooth), and mobile device security (i.e., cell phones).

301.3 HANDS ON: Networking

All attacks or exploits have one thing in common: they take something that exists for perfectly valid reasons and misuse it in malicious ways. Always! So as security practitioners, to grasp what is invalid we must first understand what is valid – that is, how things like networks are supposed to work. Only once we have that understanding can we hope to understand the mechanics of malicious misuse of those networks. Day three begins with a nontechnical explanation of how data move across a network. From there we move to fundamental terminology dealing with network types and standards. You'll learn about common network hardware such as hubs, switches, and routers, and you'll finally grasp what is meant by terms like protocol, encapsulation, and tunneling. We'll give a very basic introduction to network addressing and port numbers and then work our way up the Open Systems Interconnection (OSI) protocol stack, introducing more detail only as we proceed to the next layer. In other words, we explain networking starting in non-technical terms and gradually progress to more technical detail as students are ready to take the next step. By the end of our discussions, you'll have a fundamental grasp of any number of critical technical networking acronyms that you've often heard and never quite understood: TCP/IP, IP, TCP, UDP, MAC, ARP, NAT, ICMP, and DNS. We'll close out day three with a very simple explanation of common network attacks such as spoofing, man-in-the-middle, denial of service, and distributed denial of service.

301.4 HANDS ON: Security Technologies

Building on what we've learned about how networks function and common attacks against them, we start day four by introducing methods and technologies to manage, control, and secure those networks. Students will learn about the importance of configuration management on networks, the different types of malware, and how anti-malware works to protect us. Students will also gain an introductory knowledge of firewalls, intrusion detection and prevention, sniffers, and virtualization technologies. We will not deep dive into firewall technology, but students will become familiar with basic firewall terminology and techniques. We'll also look at methods for auditing network security and examine fundamental security techniques such as hardening operating systems.

301.5 HANDS ON: Protecting Assets

The final day of our SEC301 journey is all about protecting assets, mostly with a physical security theme but with some logical security included as well. We begin with the "meta security" discipline of operations security that looks at security issues throughout the organization, not just in the IT area. We then introduce the topic of safety and physical security. Students will become familiar with the concepts of data classification and data loss prevention. From there we move to an introductory look at incident response, including business continuity and disaster recovery planning. We'll close out with a brief discussion of social engineering so that students understand what it is and why it's so difficult to defend against.

You Will Be Able To

- Communicate with confidence regarding information security topics, terms, and concepts
- Understand and apply the Principles of Least Privilege
- Understand and apply the Confidentiality, Integrity, and Availability (CIA) Triad
- Build better passwords that are more secure while also being easier to remember and type
- Grasp basic cryptographic principles, processes, procedures, and applications
- Gain an understanding of computer network basics
- Have a fundamental grasp of any number of critical technical networking acronyms: TCP/IP, IP, TCP, UDP, MAC, ARP, NAT, ICMP, and DNS
- Utilize built-in Windows tools to see your network settings
- Recognize and discuss various security technologies including anti-malware, firewalls, and intrusion detection systems.
- Determine your "SPAM IQ" to more easily identify SPAM email messages
- Understand physical security issues and how they support cybersecurity
- Have an introductory level of knowledge regarding incident response, business continuity, and disaster recovery planning
- Install and use the following tools: Password Safe, Secunia PSI, Malwarebytes, and Syncback

"SEC301 is the perfect blend of technical and practical information for someone new to the field, would recommend to friend!"
-Steve Mecco, Draper

"Good basic information for someone just coming into the field."
-Bryce Richert, SUH

SEC401

Security Essentials Bootcamp Style

SIMULCAST
SEE PAGE 72 FOR INFO

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 7:00pm (Days 1-5)
9:00am - 5:00pm (Day 6)
Laptop Required
46 CPEs
Instructor: Dr. Eric Cole

GSEC
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MEETS DoDD 8570 REQUIREMENTS
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BUNDLE ONDEMAND
WITH THIS COURSE
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Learn the most effective steps to prevent attacks and detect adversaries with actionable techniques that you can directly apply when you get back to work. Learn tips and tricks from the experts so that you can win the battle against the wide range of cyber adversaries that want to harm your environment.

STOP and ask yourself the following questions:

- Do you fully understand why some organizations get compromised and others do not?
- If there were compromised systems on your network, are you confident that you would be able to find them?
- Do you know the effectiveness of each security device and are you certain that they are all configured correctly?
- Are proper security metrics set up and communicated to your executives to drive security decisions?

If you do not know the answers to these questions, SEC401 will provide the information security training you need in a bootcamp-style format that is reinforced with hands-on labs.

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 specialists, penetration testers, and auditors who need a solid foundation of security principles to be as effective as possible at their jobs
- Anyone new to information security with some background in information systems and networking

SEC401: Security Essentials Bootcamp Style is focused on teaching you the essential information security skills and techniques you need to protect and secure your organization's critical information assets and business systems. Our course will show you how to prevent your organization's security problems from being headline news in the Wall Street Journal!

PREVENTION IS IDEAL BUT DETECTION IS A MUST.

With the advanced persistent threat, it is almost inevitable that organizations will be targeted. Whether the attacker is successful in penetrating an organization's network depends on the effectiveness of the organization's defense. 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 really works in cybersecurity. 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 cybersecurity, three questions must be answered:

- What is the risk?
- Is it the highest priority risk?
- What is the most cost-effective way to reduce the risk?

Security is all about making sure you focus on the right areas of defense. In SEC401 you will learn the language and underlying theory of computer and information security. You will gain the essential and effective security knowledge you will need 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 learn up-to-the-minute skills you can put into practice immediately upon returning to work; and (2) You will be taught by the best security instructors in the industry.

Dr. Eric Cole *SANS Faculty Fellow*

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 Cybersecurity 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. @drericcole

401.1 HANDS ON: Networking Concepts

A key way that attackers gain access to a company's resources is through a network connected to the Internet. A company wants to try to prevent as many attacks as possible, but in cases where it cannot prevent an attack, it must detect it in a timely manner. Therefore, an understanding of how networks and the related protocols like TCP/IP work is critical to being able to analyze network traffic and determine what is hostile. It is just as important to know how to protect against these attacks using devices such as routers and firewalls. These essentials, and more, will be covered during this course day in order to provide a firm foundation for the consecutive days of training.

Topics: Network Fundamentals; IP Concepts; IP Behavior; Virtual Machines

401.2 HANDS ON: Defense In-Depth

To secure an enterprise network, you must have an understanding of the general principles of network security. In this course, you will learn about six key areas of network security. The day starts with information assurance foundations. Students look at both current and historical computer security threats, and how they have impacted confidentiality, integrity, and availability. The first half of the day also covers creating sound security policies and password management, including tools for password strength on both Unix and Windows platforms. The second half of the day is spent on understanding the information warfare threat and the six steps of incident handling. The day draws to a close by looking at what can be done to test and protect a web server in your company.

Topics: Information Assurance Foundations; Computer Security Policies; Contingency and Continuity Planning; Access Control; Password Management; Incident Response; Offensive and Defensive Information Warfare; Web Security

401.3 HANDS ON: Internet Security Technologies

Military agencies, banks, and retailers offering electronic commerce services, as well as dozens of other types of organizations, are striving to understand the threats they are facing and what they can do to address those threats. On day 3, you will be provided with a roadmap to help you understand the paths available to organizations that are considering deploying or planning to deploy various security devices and tools such as intrusion detection systems and firewalls. When it comes to securing your enterprise, there is no single technology that is going to solve all your security issues. However, by implementing an in-depth defense strategy that includes multiple risk-reducing measures, you can go a long way toward securing your enterprise.

Topics: Attack Methods; Firewalls and Perimeters; Honeypots; Host-based Protection; Network-based Intrusion Detection and Prevention; Risk Assessment and Auditing

401.4 HANDS ON: Secure Communications

There is no silver bullet when it comes to security. However, there is one technology that would help solve a lot of security issues, though few companies deploy it correctly. This technology is cryptography. Concealing the meaning of a message can prevent unauthorized parties from reading sensitive information. Day 4 looks at various aspects of encryption and how it can be used to secure a company's assets. A related area called steganography, or information hiding, is also covered. The day finishes by looking at using the Critical Security Controls for metrics-based dashboards and performing risk assessment across an organization.

Topics: Cryptography; Steganography; Critical Security Controls; Risk Assessment and Auditing

401.5 HANDS ON: Windows Security

Windows is the most widely-used and hacked operating system on the planet. At the same time, the complexities of Active Directory, PKI, BitLocker, AppLocker, and User Account Control represent both challenges and opportunities. This section will help you quickly master the world of Windows security while showing you the tools that can simplify and automate your work. You will complete the day with a solid grounding in Windows security by looking at automation, auditing, and forensics.

Topics: Security Infrastructure; Service Packs, Patches, and Backups; Permissions and User Rights; Security Policies and Templates; Securing Network Services; Auditing and Automation

401.6 HANDS ON: Unix/Linux Security

While organizations do not have as many Unix/Linux systems, for those that do have them, these systems are often among the most critical systems that need to be protected. Day 6 provides step-by-step guidance to improve the security of any Linux system by combining practical how-to instructions with background information for Linux beginners, as well as security advice and best practices for administrators with all levels of expertise.

Topics: Linux Landscape; Permissions and User Accounts; Linux OS Security; Maintenance, Monitoring, and Auditing Linux; Linux Security Tools

You Will Be Able To

- Design and build a network architecture using VLANs, NAC and 802.1x based on an 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 operate a virtual lab to test and evaluate the tools/security of systems
- Create an effective policy that can be enforced within an organization and prepare a checklist to validate security, creating metrics to tie into training and awareness
- Identify visible weaknesses of a system utilizing various tools including dumpsec and OpenVAS, and once vulnerabilities are discovered cover ways to configure the system to be more secure
- Build a network visibility map that can be used for hardening of a network – validating the attack surface and covering ways to reduce it through hardening and patching
- Sniff open protocols like telnet and ftp and determine the content, passwords and vulnerabilities utilizing WireShark
- Apply what you learned directly to your job when you go back to work

"This was my first SANS course – I didn't know what to expect. Now that I've been through a course, I must say, the experience was fantastic!"

-Gary Hughes, Seagate Technology

SEC501

Advanced Security Essentials – Enterprise Defender

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Paul A. Henry

giac.org

sans.edu

MEETS DoDD 8570 REQUIREMENTS

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WITH THIS COURSE
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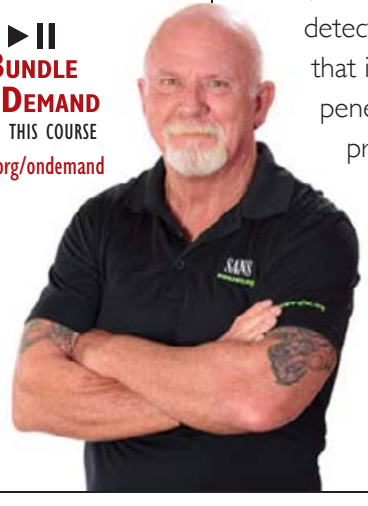

Effective cybersecurity is more important than ever as attacks become stealthier, have a greater financial impact, and cause broad reputational damage. **SEC501: Advanced Security Essentials – Enterprise Defender** builds on a solid foundation of core policies and practices to enable security teams to defend their enterprise.

Who Should Attend

- Incident response and penetration testers
- Security Operations Center engineers and analysts
- Network security professionals
- Anyone who seeks technical in-depth knowledge about implementing comprehensive security solutions

It has been said of security that "prevention is ideal, but detection is a must." However, detection without response has little value. Network security needs to be constantly improved to prevent as many attacks as possible and to swiftly detect and respond appropriately to any breach that does occur. This PREVENT - DETECT - RESPONSE strategy must be in place both externally and internally. As data become more portable and networks continue to be porous, there needs to be an increased focus on data protection. Critical information must be secured regardless of whether it resides on a server, in a robust network architecture, or on a portable device.

"Great instructor with the ability to tie real-world threats to theory and practice."
-Bruce Henkel, Harris Corp.

Despite an organization's best efforts to prevent network attacks and protect its critical data, some attacks will still be successful. Therefore, organizations need to be able to detect attacks in a timely fashion. This is accomplished by understanding the traffic that is flowing on your networks, looking for indications of an attack, and performing penetration testing and vulnerability analysis against your organization to identify problems and issues before a compromise occurs.

Finally, once an attack is detected we must react quickly and effectively and perform the forensics required. Knowledge gained by understanding how the attacker broke in can be fed back into more effective and robust preventive and detective measures, completing the security lifecycle.

Paul A. Henry *SANS Senior Instructor*

Paul Henry is one of the world's foremost global information security and computer forensic experts, with more than 20 years of experience managing security initiatives for Global 2000 enterprises and government organizations worldwide. Paul is a principal at vNet Security, LLC and is keeping a finger on the pulse of network security as the security and forensic analyst at Lumension Security. Throughout his career, Paul has played a key strategic role in launching new network security initiatives to meet our ever-changing threat landscape. Paul also advises and consults on some of the world's most challenging and high-risk information security projects, including the National Banking System in Saudi Arabia, the Reserve Bank of Australia, the U.S. Department of Defense's Satellite Data Project, and both government as well as telecommunications projects throughout Southeast Asia. Paul is frequently cited by major and trade print publications as an expert on computer forensics, technical security topics, and general security trends and serves as an expert commentator for network broadcast outlets such as FOX, NBC, CNN, and CNBC. In addition, Paul regularly authors thought leadership articles on technical security issues, and his expertise and insight help shape the editorial direction of key security publications, such as the Information Security Management Handbook, to which he is a consistent contributor. Paul serves as a featured and keynote speaker at seminars and conferences worldwide, delivering presentations on diverse topics including anti-forensics, network access control, cyber crime, DDoS attack risk mitigation, firewall architectures, security architectures, and managed security services. @phenrycissp

501.1 HANDS ON: Defensive Network Infrastructure

Protecting a network from attack starts with designing, building, and implementing a robust network infrastructure. Many aspects of implementing a defense-in-depth network are often overlooked because organizations 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 more stealthy 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 be shown 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 penetration 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 investigations and find indications of an attack. This information will be fed into the incident response process to ensure that 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 as well as the 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

Cybersecurity 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)

You Will Be Able To

- Identify the threats against network infrastructures and build defensible networks that minimize the impact of attacks
- Use the tools designed 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 six steps in the incident handling process and create and run an incident-handling capability
- Use various tools to identify and remediate malware across your organization
- Create a data classification program and deploy data loss prevention solutions at both a host and network level

"This course was most valuable. The demos and materials combined with the instructor's detailed explanation, experience, and recommendations, gave information I can apply immediately when I return to work."
-Rowley Molina, Altria

"Paul Henry is colorful and knowledgable. He added value to the content beyond my expectation. Because of him, I will attend future SANS training and recommend it to my peers."
-Michael Bradley, Highline College

SEC503 Intrusion Detection In-Depth

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Mike Poor

giac.org

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MEETS DoDD 8570 REQUIREMENTS

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BUNDLE ONDEMAND WITH THIS COURSE
sans.org/ondemand

Reports of prominent organizations being hacked and suffering irreparable reputational damage have become all too common. How can you prevent your company from becoming the next victim of a major cyber attack?

Who Should Attend

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

SEC503: Intrusion Detection In-Depth delivers the technical knowledge, insight, and hands-on training you need to defend your network with confidence. You will learn about the underlying theory of TCP/IP and the most used application protocols, such as HTTP, so that you can intelligently examine network traffic for signs of an intrusion. You will get plenty of practice learning to configure and master different open-source tools like tcpdump, Wireshark, Snort, Bro, and many more. Daily hands-on exercises suitable for all experience levels reinforce the course book material so that you can transfer knowledge to execution. Basic exercises include assistive hints while advanced options provide a more challenging experience for students who may already know the material or who have quickly mastered new material. In addition, most exercises include an "extra credit" stumper question intended to challenge even the most advanced student.

"Today has been brilliant, bringing all of our skills together to achieve the challenge. I wish we could do this every day!" -Hayley Roberts, MOD

Industry expert Mike Poor has created a VMware distribution, Packetrix, specifically for this course. As the name implies, Packetrix contains many of the tricks of the trade to perform packet and traffic analysis. It is supplemented with demonstration "pcaps," which are files that contain network traffic. This allows students to follow along on their laptops with the class material and demonstrations. The pcaps also provide a good library of network traffic to use when reviewing the material, especially for certification.

Preserving the security of your site in today's threat environment is more challenging than ever before. The security landscape is continually changing from what was once only perimeter protection to protecting exposed and mobile systems that are almost always connected and often vulnerable. Security-savvy employees who can help detect and prevent intrusions are therefore in great demand. Our goal in **SEC503: Intrusion Detection In-Depth** is to acquaint you with the core knowledge, tools, and techniques to defend your networks. The training will prepare you to put your new skills and knowledge to work immediately upon returning to a live environment.

Mike Poor *SANS Senior Instructor*

Mike Poor is a founder and senior security analyst for the Washington, DC firm InGuardians, 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 on 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. @Mike_Poor

503.1 HANDS ON: Fundamentals of Traffic Analysis: PART 1

Day 1 provides a refresher or introduction to TCP/IP, depending on your background, 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, and 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: Layer 2; IP Layer: Layer 3, IPv4, and IPv6

503.2 HANDS ON: Fundamentals of Traffic Analysis: PART 2

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; Writing tcpdump 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: Open-Source IDS: Snort and Bro

We take a unique approach of teaching both open-source IDS solutions by presenting them in their operational life-cycle phases from planning to updating. This will offer you a broader view of what is entailed for the production and operation of each of these open-source tools. This is more than just a step-by-step discussion of install, configure, and run the tools. This approach provides a recipe for a successful deliberated deployment, not just a haphazard "download and install the code and hope for the best."

Topics: Operational Lifecycle of Open-Source IDS; Introduction; Snort; Bro; Comparing Snort and Bro to Analyze Same Traffic

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 exercise that challenges you to 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 because 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.

You Will Be Able To

- Configure and run open-source Snort and write Snort signatures
- Configure and run open-source Bro to provide a hybrid traffic analysis framework
- Understand TCP/IP component layers to identify normal and abnormal traffic
- Use open-source traffic analysis tools to identify signs of an intrusion
- Comprehend the need to employ network forensics to investigate traffic to identify and investigate a possible intrusion
- Use Wireshark to carve out suspicious file attachments
- Write tcpdump filters to selectively examine a particular traffic trait
- Synthesize disparate log files to widen and augment analysis
- Use the open-source network flow tool SiLK to find network behavior anomalies
- Use your knowledge of network architecture and hardware to customize placement of IDS sensors and sniff traffic off the wire

"SEC503 covers the best processes for intrusion analysis and how to cut out most of the network noise and identify the important traffic. Mike Poor is a rock-star, and I look forward to learning more from him in the future."

-Mike Boya, Warner Bros.

"Mike is beyond excellent. He is a great presenter/instructor and keeps it interesting with real-world examples willing to go above and beyond sessions before and after class. Awesome guy!"

-Stace McRae, Parsons

SEC504

Hacker Tools, Techniques, Exploits, and Incident Handling

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 7:15pm (Day 1)
9:00am - 5:00pm (Days 2-6)
37 CPEs
Laptop Required
Instructor: John Strand

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MEETS DoDD 8570 REQUIREMENTS

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WITH THIS COURSE
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The Internet is full of powerful hacking tools and bad guys using them extensively. If your organization has an Internet connection or one or two disgruntled employees (and whose does not!), 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. As defenders, it is essential we understand these hacking tools and techniques.

Who Should Attend

- Incident handlers
- 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

"Our organization has incident response pieces all over. This course is valuable in putting the pieces together and improving the plan and, more importantly, the mindset." -Tyler Burwitz, TEEX

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, this course helps you turn the tables on computer attackers. It addresses the latest cutting-edge insidious attack vectors, the "oldie-but-goodie" attacks that are still prevalent, and everything in between. Instead of merely teaching a few hack attack tricks, this course provides a time-tested, step-by-step process for responding to computer incidents, and a detailed description of how attackers undermine systems so you can prepare for, detect, and respond to them. In addition, the course explores the legal issues associated with responding to computer attacks, including employee monitoring, working with law enforcement, and handling evidence. Finally, students will participate in a hands-on workshop that focuses on scanning, exploiting, and defending systems. It will enable you to discover the holes in your system before the bad guys do!

"John Strand opened my eyes and helped me understand how to approach the concepts of offensive security and incident handling. He is one of the very best." -Stephen Ellis, CB&I

The course is particularly well-suited to individuals who lead or are a part of an incident handling team. 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.

John Strand *SANS Senior Instructor*

Along with SEC504, John Strand 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. @strandjs

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

The first part of this section looks at the invaluable Incident Handling Step-by-Step model, which was created through a consensus process involving experienced incident handlers from corporations, government agencies, and educational institutes, and has been proven effective in hundreds of organizations. This section is designed to provide students a complete introduction to the incident handling process, using the six steps (preparation, identification, containment, eradication, recovery, and lessons learned) necessary to prepare for and deal with a computer incident. The second part of this section examines from-the-trenches case studies to understand what does and does not work in identifying computer attackers. This section provides valuable information on the steps a systems administrator can take to improve the chances of catching and prosecuting attackers.

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

Seemingly innocuous data leaking from your network could provide the clue needed by an attacker to blow your systems wide open. This day-long course covers the details associated with reconnaissance and scanning, the first two phases of many computer attacks.

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. Attackers employ a variety of strategies to take over systems from the network level up to the application level. This section covers the attacks in depth, from the details of buffer overflow and format string attack techniques to the latest in session hijacking of supposedly secure protocols

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

This course starts out by covering one of the attackers' favorite techniques for compromising systems: worms. We will analyze worm developments over the last two years and project these trends into the future to get a feel for the coming Super Worms we will face. Then the course turns to another vital area often exploited by attackers: web applications. Because most organizations' homegrown web applications do not get the security scrutiny of commercial software, attackers exploit these targets using SQL injection, cross-site scripting, session cloning, and a variety of other mechanisms discussed in detail.

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

This day-long course covers the fourth and fifth steps of many hacker attacks: maintaining access and covering their tracks. Computer attackers install backdoors, apply Rootkits, and sometimes even manipulate the underlying kernel itself to hide their nefarious deeds. Each of these categories of tools requires specialized defenses to protect the underlying system. In this course, we will analyze the most commonly used malicious code specimens, as well as explore future trends in malware, including BIOS-level and combo malware possibilities.

Topics: Maintaining Access; Covering the Tracks; Putting It All Together; Hands-on Exercises with a List of Tools

504.6 HANDS ON: Hacker Tools Workshop

Over the years, the security industry has become smarter and more effective in stopping hackers. Unfortunately, hacker tools are becoming smarter and more complex. One of the most effective methods to stop the enemy is to actually test the environment with the same tools and tactics an attacker might use against you. This workshop lets you put what you have learned over the past week into practice.

Topics: Hands-on Analysis

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 in order 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 to 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 choose appropriate response actions based on each attacker's flood technique
- Analyze shell history files to find compromised machines, attacker-controlled accounts, sniffers, and backdoors

SEC505

Securing Windows with PowerShell & the Critical Security Controls

SANS

Six-Day Program
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What is Windows Hello in Windows 10? How can we defend against pass-the-hash attacks, administrator account compromise, and the lateral movement of hackers inside our networks? How do we actually implement the Critical Security Controls on Windows in a large environment? How can we significantly reduce the client-side exploits that lead to advanced persistent threat malware infections? We tackle these tough problems in **SEC505: Securing Windows with PowerShell and the Critical Security Controls**.

Who Should Attend

- Anyone who wants to learn PowerShell
- Windows security engineers and system administrators
- Anyone implementing the Critical Security Controls
- Those who must enforce security policies on Windows hosts
- Those deploying or managing a PKI or smart cards
- Anyone who needs to reduce APT malware infections

Understanding how penetration testers and hackers break into networks is not the same as knowing how to design defenses against them, especially when you work in a large and complex Active Directory environment. Knowing about tools like Metasploit, Cain, Netcat, and Poison Ivy is useful, but there is no simple patch against their abuse. The goal of this course is to show you ways to defend against both current Windows attack techniques and the likely types of attacks we can expect in the future. This requires more than just reactive patch management – we need to proactively design security into our systems and networks. That is what SEC505 is about.

"SEC505 is very well structured and organized and provided me with an in-depth understanding of Windows security." -Rochana Lahiri, BCBSLA

Your adversaries want to elevate their privileges to win control over your servers and domain controllers, so a major theme of this course is controlling administrative powers through Group Policy and PowerShell scripting.

Learning PowerShell is probably the single best new skill for Windows administrators, especially with the trend toward cloud computing. Most of your competition in the job market lacks scripting skills, so knowing PowerShell is a great way to make your résumé stand out. This course devotes the entire first day to PowerShell, then we do more PowerShell exercises throughout the rest of the week. Don't worry, you don't need any prior scripting experience to attend.

"I loved SEC505 and when I return to the office, I am recommending it to the rest of my team." -Alex Fox, Federal Home Loan Bank Chicago

SEC505 will also prepare you for the GIAC Certified Windows Security Administrator (GCWN) exam to certify your Windows security expertise. The GCWN certification counts toward getting a Master's Degree in information security from the SANS Technology Institute (**sans.edu**) and also satisfies the Department of Defense 8570 computing environment requirement.

This is a fun course and a real eye-opener, even for Windows administrators with years of experience. Come have fun learning PowerShell and Windows security!

Jason Fossen *SANS Faculty Fellow*

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. @JasonFossen

505.1 HANDS ON: Windows PowerShell Scripting

Today's course covers everything you need to know to get started using PowerShell. You don't need to have any prior scripting or programming experience. After today, we will look at PowerShell examples throughout the week as we work with our regular graphical tools to manage security. Ideally, we want to be able to manage security using either graphical tools or PowerShell (and usually both). In fact, some Microsoft graphical management tools are already built on top of PowerShell, and Microsoft is building more administrative tools this way.

Topics: Overview and Security; Getting Around Inside PowerShell; Example Commands; Write Your Own Scripts

505.2 HANDS ON: Windows Operating System and Applications Hardening

The trick is hardening Windows in a way that is cost-effective, scalable, and has a minimal impact on users. We will look at tools like EMET and Group Policy to make that process easier. As throughout the week, today's section will also look at how to implement many of the Critical Security Controls. The day begins with a continuation of the PowerShell material on the first day. In PowerShell, we will see how to interact with the Windows Management Instrumentation (WMI) service on remote computers. By talking to the WMI service, we can search event logs, start or stop processes, manage DNS records, reboot systems, and do hundreds of other tasks. PowerShell and WMI are tightly integrated, and learning WMI is very important for honing your PowerShell skills as a cyber-defense operator.

Topics: PowerShell and Windows Management Instrumentation (WMI); Going Beyond Just Anti-Virus Scanning; OS Hardening with Security Templates; Hardening with Group Policy

505.3 HANDS ON: High-Value Targets and Restricting Administrative Compromise

Hackers love it when "regular" users are members of the local Administrators group on their computers because it makes it easier to compromise those computers and then to move laterally to other machines. We will talk about what is so dangerous about the Administrators group, how to get users out of that group while still allowing them to get their work done, and, if we just cannot get users out of Administrators, then how to make User Account Control (UAC) less annoying to them...and to us. We will also see how to delegate authority in Active Directory. Like almost everything else, Active Directory can be managed through PowerShell. In today's PowerShell section, we will see how to create, delete, and edit objects in Active Directory, such as user accounts and passwords.

Topics: Compromise of Administrative Powers; PowerShell for Active Directory; Active Directory Permissions and Delegation

You Will Be Able To

- Use Group Policy to harden Windows and applications, deploy Microsoft EMET, do AppLocker whitelisting, apply security templates, and write your own PowerShell scripts.
- Implement Dynamic Access Control (DAC) 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, certificate auto-enrollment, and detection of spoofed root CAs.
- Harden SSL, RDP, DNS, and other dangerous protocols.
- Deploy Windows Firewall and IPSec rules through Group Policy and PowerShell.
- Automate security tasks on local and remote systems with the PowerShell scripting language and remoting framework.

505.4 HANDS ON: Windows PKI, Smart Cards, and Managing Cryptography

PowerShell management of PKI and cryptography can be a challenge, but there are tricks to making it easier. In this course, we will see how PowerShell can access certificates, audit our lists of trusted certification authorities, perform file hashing, and encrypt secret data, such as user passwords being sent over the wire. In fact, one of the scripts we use during the week does exactly that – it resets an administrator's password, and the password is encrypted with our public key, and then sent securely over the network for archival. This sounds complex, but PowerShell makes it relatively easy.

Topics: Why Have Public Key Infrastructure?; How to Install the Windows PKI; How to Manage Your PKI; Deploying Smart Cards

505.5 HANDS ON: Server Hardening, IPSec, and Critical Protocols

IPSec is not just for VPNs. IPSec can authenticate users in Active Directory to implement share permissions for TCP and UDP ports based on the user's global group memberships. IPSec can also encrypt packet payloads to keep data secure. Imagine configuring the Windows Firewall on your servers and tablets to only permit access to your RPC or SMB ports if (1) the client has a local IP address, (2) the client is authenticated by IPSec to be a member of the domain, and (3) the packets are all encrypted with 256-bit AES. This is not only possible, it is actually relatively easy to deploy with Group Policy and can be scripted in PowerShell. This course section will show exactly how to do this.

Topics: Creating IPSec Policies; Windows Firewall; Dangerous Server Protocols; Server Hardening

505.6 HANDS ON: Dynamic Access Control and Hardening DNS

Today's course also continues the server hardening theme from the previous day with coverage of DNS security. DNS is mandatory on our networks, but the protocol itself is horrible – hackers love it! There are several things we can do to make DNS less insecure. We can use DNSSEC to digitally sign DNS records to prevent spoofing and man-in-the-middle attacks, do DNS secure dynamic updates with Kerberos, set permissions on DNS records in Active Directory, use the DNS sinkhole technique to frustrate malware, and apply IPSec to DNS packets. DNS was not designed for security to begin with, so security has to be bolted on afterward. Finally, it is no surprise that PowerShell can be used to manage DNS and Dynamic Access Control (DAC) settings. We will see plenty of examples, such as a PowerShell script for DNS sinkholing and PowerShell commands to manage DAC claims and file classifications.

Topics: Dynamic Access Control (DAC); Hardening DNS

SEC511

Continuous Monitoring and Security Operations

SANS

Six-Day Program
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36 CPEs
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Instructor: Seth Misenar

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SIMULCAST
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We continue to underestimate the tenacity of our adversaries! Organizations are investing a significant amount of time and financial and human resources trying to combat cyber threats and prevent cyber attacks, but despite this tremendous effort organizations are still getting compromised. The traditional perimeter-focused, prevention-dominant approach to security architecture has failed to prevent intrusions. No network is impenetrable, a reality that business executives and security professionals alike have to accept. Prevention is crucial, and we can't lose sight of it as the primary goal. However, a new proactive approach to security is needed to enhance the capabilities of organizations to detect threats that will inevitably slip through their defenses.

Who Should Attend

- Security architects
- Senior security engineers
- Technical security managers
- Security Operations Center (SOC) analysts
- SOC engineers
- SOC managers
- CND analysts
- Individuals working to implement Continuous Diagnostics and Mitigation (CDM), Continuous Security Monitoring (CSM), or Network Security Monitoring (NSM)

The underlying challenge for organizations victimized by an attack is timely incident detection. Industry data suggest that most security breaches typically go undiscovered for an average of seven months. Attackers simply have to find one way into most organizations, because they know that the lack of visibility and internal security controls will then allow them to methodically carry out their mission and achieve their goals.

The Defensible Security Architecture, Network Security Monitoring (NSM)/Continuous Diagnostics and Mitigation (CDM)/Continuous Security Monitoring (CSM) taught in this course will best position your organization or Security Operations Center (SOC) to analyze threats and detect anomalies that could indicate cybercriminal behavior. The payoff for this new proactive approach would be early detection of an intrusion, or successfully thwarting the efforts of attackers altogether. The National Institute of Standards and Technology (NIST) developed guidelines described in NIST SP 800-137 for Continuous Monitoring (CM), and this course will greatly increase your understanding and enhance your skills in implementing CM utilizing the NIST framework.

SEC511 will take you on quite a journey. We start by exploring traditional security architecture to assess its current state and the attacks against it. Next, we discuss and discover modern security design that represents a new proactive approach to such architecture that can be easily understood and defended. We then transition to how to actually build the network and endpoint security, and then carefully navigate our way through automation, NSM/CDM/CSM. For timely detection of potential intrusions, the network and systems must be proactively and continuously monitored for any changes in the security posture that might increase the likelihood that attackers will succeed.

Your SEC511 journey will conclude with one last hill to climb! The final day (Day 6) features a Capture-the-Flag competition that challenges you to apply the skills and techniques learned in the course to detect and defend the modern security architecture that has been designed. Course authors Eric Conrad and Seth Misenar have designed the Capture-the-Flag competition to be fun, engaging, comprehensive, and challenging. You will not be disappointed!

Seth Misenar *SANS Senior Instructor*

Seth Misenar serves as lead consultant and founder of Jackson, Mississippi-based Context Security, which provides information security thought 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 as 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 that include, but are not limited to, the following: CISSP, GPEN, GWAPT, GSEC, GCIA, GCIH, GCWN, GCFA, and MCSE. @sethmisenar

511.1 HANDS ON: Current State Assessment, SOCs & Security Architecture

We begin with the end in mind by defining the key techniques and principles that will allow us to get there. An effective modern SOC or security architecture must enable an organization's ability to rapidly find intrusions to facilitate containment and response. Both significant knowledge and a commitment and continuous monitoring are required to achieve this goal.

Topics: Current State Assessment, SOCs, and Security Architecture; Modern Security Architecture Principles; Frameworks and Enterprise Security Architecture; Security Architecture – Key Techniques/Practices; Security Architecture – Design Tools/Strategies; Security Operations Center

511.2 HANDS ON: Network Security Architecture

Understanding the problems with the current environment and realizing where we need to get to is far from sufficient: we need a detailed roadmap to bridge the gap between the current and desired state. Day 2 introduces and details the components of our infrastructure that become part of a defensible network security architecture and SOC. We are long past the days when a perimeter firewall and ubiquitous antivirus were sufficient security. There are many pieces and moving parts that make up a modern defensible security architecture.

Topics: SOCs/Security Architecture – Key Infrastructure Devices; Segmented Internal Networks; Defensible Network Security Architecture Principles Applied

511.3 HANDS ON: Network Security Monitoring

Designing a SOC or security architecture that enhances visibility and detective capabilities represents a paradigm shift for most organizations. However, the design is simply the beginning. The most important element of a modern security architecture is the emphasis on detection. The network security architecture presented in days one and two emphasized baking visibility and detective capabilities into the design. Now we must figure out how to look at the data and continuously monitor the enterprise for evidence of compromise or changes that increase the likelihood of compromise.

Topics: Continuous Monitoring Overview; Network Security Monitoring (NSM); Practical NSM Issues; Cornerstone NSM

511.4 HANDS ON: Endpoint Security Architecture

One of the hallmarks of modern attacks is an emphasis on client-side exploitation. The days of breaking into networks via direct frontal assaults on unpatched mail, web, or DNS servers are largely behind us. We must focus on mitigating the risk of compromise of clients. Day four details ways in which endpoint systems can be both more resilient to attack and also enhance detective capabilities.

Topics: Security Architecture – Endpoint Protection; Dangerous Endpoint Applications; Patching

511.5 HANDS ON: Automation and Continuous Security Monitoring

Network Security Monitoring (NSM) is the beginning: we need to not only detect active intrusions and unauthorized actions, but also to know when our systems, networks, and applications are at an increased likelihood for compromise. A strong way to achieve this is through Continuous Security Monitoring (CSM) or Continuous Diagnostics and Mitigation (CDM). Rather than waiting for the results of a quarterly scan or an annual penetration test to determine what needs to be addressed, continuous monitoring proactively and repeatedly assesses and reassesses the current security posture for potential weaknesses that need be addressed.

Topics: CSM Overview; Industry Best Practices; Winning CSM Techniques; Maintaining Situational Awareness; Host, Port and Service Discovery; Vulnerability Scanning; Monitoring Patching; Monitoring Applications; Monitoring Service Logs; Monitoring Change to Devices and Appliances; Leveraging Proxy and Firewall Data; Configuring Centralized Windows Event Log Collection; Monitoring Critical Windows Events; Scripting and Automation

511.6 HANDS ON: Capstone: Design, Detect, and Defend

The course culminates in a team-based Capture-the-Flag challenge that is a full day of hands-on work applying the principles taught throughout the week.

Topics: Security Architecture; Assessing Provided Architecture; Continuous Security Monitoring; Using Tools/Scripts Assessing the Initial State; Quickly/Thoroughly Find All Changes Made

You Will Be Able To

- Analyze a security architecture for deficiencies
- Apply the principles learned in the course to design a defensible security architecture
- Understand the importance of a detection-dominant security architecture and Security Operations Center (SOC)
- Identify the key components of Network Security Monitoring (NSM)/Continuous Diagnostics and Mitigation (CDM)/Continuous Monitoring (CM)
- Determine appropriate security monitoring needs for organizations of all sizes
- Implement robust Network Security Monitoring/Continuous Security Monitoring (NSM/CSM)
- Determine requisite monitoring capabilities for a SOC environment
- Determine capabilities required to support continuous monitoring of key Critical Security Controls
- Utilize tools to support implementation of Continuous Monitoring per NIST guidelines SP 800-137

"I work in net security with a lot of tools. Seth provided a great perspective on the state of cyber defense and how we should be approaching it."

-Kevin South, Navient

"I run SOCs and this course provides a gut check against what we are doing today."

-Tim Housman,

General Dynamics Information Technology

SEC542

Web App Penetration Testing and Ethical Hacking

SANS

Six-Day Program
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Laptop Required
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SIMULCAST
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Web applications play a vital role in every modern organization. However, if your organization doesn't properly test and secure its web apps, adversaries can compromise these applications, damage business functionality, and steal data. Unfortunately, many organizations operate under the mistaken impression that a web application security scanner will reliably discover flaws in their systems.

Who Should Attend

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

SEC542 helps students move beyond push-button scanning to professional, thorough, and high-value web application penetration testing.

Customers expect web applications to provide significant functionality and data access. Even beyond the importance of customer-facing web applications, internal web applications increasingly represent the most commonly used business tools within any organization. Unfortunately, there is no "patch Tuesday" for custom web applications. Major industry studies find that web application flaws play a major role in significant breaches and intrusions. Adversaries increasingly focus on these high-value targets either by directly abusing public-facing applications or by focusing on web apps as targets after an initial break-in.

Modern cyber defense requires a realistic and thorough understanding of web application security issues. Anyone can learn to sling a few web hacks, but effective web application penetration testing requires something deeper.

SEC542 enables students to assess a web application's security posture and convincingly demonstrate the impact of inadequate security that plagues most organizations.

Students will come to understand major web application flaws and their exploitation and, most importantly, learn a field-tested and repeatable process to consistently find these flaws and convey what they have learned to their organizations. Even technically gifted security geeks often struggle with helping organizations understand risk in terms relatable to business. Much of the art of penetration testing has less to do with learning how adversaries are breaking in than it does with convincing an organization to take the risk seriously and employ appropriate countermeasures. The goal of SEC542 is to better secure organizations through penetration testing, and not just show off hacking skills. The course will help you demonstrate the true impact of web application flaws through exploitation.

In addition to high-quality course content, SEC542 focuses heavily on in-depth, hands-on labs to ensure that students can immediately apply all they learn.

In addition to more than 30 formal hands-on labs, the course culminates in a web application pen test tournament, powered by the SANS NetWars Cyber Range. This Capture the Flag event on the final day brings students into teams to apply their newly acquired command of web application penetration testing techniques in a fun way to hammer home lessons learned.

Eric Conrad *SANS Senior Instructor*

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 ericconrad.com. @eric_conrad

542.1 HANDS ON: The Attacker's View of the Web

Understanding the attacker's perspective is key to successful web application penetration testing. The course begins by thoroughly examining web technology, including protocols, languages, clients and server architectures, from the attacker's perspective. We will also examine different authentication systems, including Basic, Digest, Forms and Windows Integrated authentication, and discuss how servers use them and attackers abuse them.

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

542.2 HANDS ON: Reconnaissance and Mapping

The second day starts the actual penetration testing process, beginning with the reconnaissance and mapping phases. Reconnaissance includes gathering publicly available information regarding the target application and organization, identifying the machines that support our target application and building a profile of each server, including the operating system, specific software and configuration. Our discussion will be augmented by practical, hands-on exercises in which we conduct reconnaissance against an in-class target.

Topics: Discovering the Infrastructure Within the Application; Identifying the Machines and Operating Systems; Secure Sockets Layer (SSL) Configurations and Weaknesses; Exploring Virtual Hosting and Its Impact on Testing; Learning Methods to Identify Load Balancers; Software Configuration Discovery; Exploring External Information Sources; Google Hacking; Learning 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: Discovery

This section continues to explore our methodology with the discovery phase. We will build on the information started the previous day, exploring methods to find and verify vulnerabilities within the application. Students will also begin to explore the interactions between the various vulnerabilities.

Topics: Vulnerability Discovery Overview; Creating Custom Scripts for Penetration Testing; Python for Penetration Testing; Web App Vulnerabilities and Manual Verification Techniques; Interception Proxies; Fiddler; Zed Attack Proxy (ZAP); Burp Suite; Information Leakage, and Directory Browsing; Username Harvesting; Command Injection; Directory Traversal; SQL Injection; Blind SQL Injection

542.4 HANDS ON: Discovery (CONTINUED)

On day four, students continue exploring the discovery phase of the methodology. We cover methods to discover key vulnerabilities within web applications, such as Cross-Site Scripting (XSS) and Cross-Site Request Forgery (CSRF/XSRF). Manual discovery methods are employed during hands-on labs.

Topics: Cross-Site Scripting (XSS); Cross-Site Scripting Discovery; Cross-Site Request Forgery (CSRF); Session Flaws; Session Fixation; AJAX; Logic Attacks; API Attacks; Data Binding Attacks; patproxy; Automated Web Application Scanners; skipfish; w3af

542.5 HANDS ON: Exploitation

On the fifth day, we launch actual exploits against real-world applications, building on the previous three steps, expanding our foothold within the application, and extending it to the network on which it resides. As penetration testers, we specifically focus on ways to leverage previously discovered vulnerabilities to gain further access, highlighting the cyclical nature of the four-step attack methodology.

Topics: Exploring Methods to Zombify Browsers; Discussing Using Zombies to Port Scan or Attack Internal Networks; Exploring Attack Frameworks; Browser Exploitation Framework (BeEF); Walking Through an Entire Attack Scenario; Exploiting the Various Vulnerabilities Discovered; Leveraging Attacks to Gain Access to the System; How to Pivot Our Attacks Through a Web Application; Understanding Methods of Interacting with a Server Through SQL Injection; Exploiting Applications to Steal Cookies; Executing Commands Through Web Application Vulnerabilities

542.6 HANDS ON: Powered by NetWars

On day six, students form teams and compete in a web application penetration testing tournament. This NetWars-powered Capture-the-Flag exercise provides students an opportunity to wield their newly developed or further-honed skills to answer questions, complete missions, and exfiltrate data, applying skills gained throughout the course. The style of challenge and integrated-hint system allows students of various skill levels to both enjoy a game environment and solidify the skills learned in class.

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 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

"The content in SEC542 is very relevant as it features recently discovered vulnerabilities. It also effectively, from my view, caters to various experience levels."
-Malcolm King, Morgan Stanley

"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

SEC560 Network Penetration Testing and Ethical Hacking

SANS

NEW!

SIMULCAST
SEE PAGE 72 FOR INFO

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 7:15pm (Day 1)
9:00am - 5:00pm (Days 2-6)
37 CPEs
Laptop Required
Instructor: Ed Skoudis

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As a cybersecurity professional, you have a unique responsibility to find and understand your organization's vulnerabilities, and to work diligently to mitigate them before the bad guys pounce. Are you ready? SANS SEC560, our flagship course for penetration testing, fully arms you to address this task head-on.

SEC560 is the must-have course for every well-rounded security professional.

With comprehensive coverage of tools, techniques, and methodologies for network penetration testing, SEC560 truly prepares you to conduct high-value penetration testing projects step-by-step and end-to-end. Every organization needs skilled information security personnel who can find vulnerabilities and mitigate their effects, and this entire course is specially designed to get you ready for that role. The course starts with proper planning, scoping and recon, then dives deep into scanning, target exploitation, password attacks, and web app manipulation, with over 30 detailed hands-on labs throughout. The course is chock full of practical, real-world tips from some of the world's best penetration testers to help you do your job safely, efficiently…and masterfully.

Who Should Attend

- Security personnel whose job involves assessing networks and systems to find and remediate vulnerabilities
- Penetration testers
- Ethical hackers
- Defenders who want to better understand offensive methodologies, tools, and techniques
- Auditors who need to build deeper technical skills
- Red and blue team members
- Forensics specialists who want to better understand offensive tactics

Learn the best ways to test your own systems before the bad guys attack.

SEC560 is designed to get you ready to conduct a full-scale, high-value penetration test – and on the last day of the course you'll do just that. After building your skills in comprehensive and challenging labs over five days, the course culminates with a final full-day, real-world pen-etration test scenario. You'll conduct an end-to-end pen test, applying knowledge, tools, and principles from throughout the course as you discover and exploit vulnerabilities in a realistic sample target organization, demonstrating the knowledge you've mastered in this course.

You will bring comprehensive penetration testing and ethical hacking know-how back to your organization.

You will learn how to perform detailed reconnaissance, studying a target's infrastructure by mining blogs, search engines, social networking sites, and other Internet and intranet infrastructures. Our hands-on labs will equip you to scan target networks using best-of-breed tools. We won't just cover run-of-the-mill options and configurations, we'll also go over the lesser known but super-useful capabilities of the best pen test toolsets available today. After scanning, you'll learn dozens of methods for exploiting target systems to gain access and measure real business risk. You'll dive deep into post-exploitation, password attacks, and web apps, pivoting through the target environment to model the attacks of real-world bad guys to emphasize the importance of defense in depth.

Ed Skoudis *SANS Faculty Fellow*

Ed Skoudis is the founder of Counter Hack, an innovative organization that designs, builds, and operates popular infosec challenges and simulations including CyberCity, NetWars, Cyber Quests, and Cyber Foundations. As director of the CyberCity project, Ed oversees the development of missions that help train cyber warriors in how to defend the kinetic assets of a physical, miniaturized city. Ed's expertise includes hacker attacks and defenses, incident response, and malware analysis, with over 15 years of experience in information security. Ed authored and regularly teaches the SANS courses on network penetration testing (SEC560) and incident response (SEC504), helping over 3,000 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 government, military, financial, high technology, healthcare, and other industries. 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 and penetration testing. @edskoudis

560.1 HANDS ON: Comprehensive Pen Test Planning, Scoping, and Recon

In this section of the course, you will develop the skills needed to conduct a best-of-breed, high-value penetration test. We will go in-depth on how to build penetration testing infrastructure that includes all the hardware, software, network infrastructure, and tools you will need to conduct great penetration tests, with specific low-cost recommendations for your arsenal. We will then cover formulating a pen test scope and rules of engagement that will set you up for success, including a role-play exercise. We'll also dig deep into the reconnaissance portion of a penetration test, covering the latest tools and techniques, including hands-on document metadata analysis to pull sensitive information about a target environment, as well as a lab using Recon-ng to plunder a target's DNS infrastructure for information such as the anti-virus tools the organization relies on.

Topics: The Mindset of the Professional Pen Tester; Building a World-Class Pen Test Infrastructure; Creating Effective Pen Test Scopes and Rules of Engagement; Detailed Recon Using the Latest Tools; Effective Pen Test Reporting to Maximize Impact; Mining Search Engine Results; Document Metadata Extraction and Analysis

560.2 HANDS ON: In-Depth Scanning

We next focus on the vital task of mapping the target environment's attack surface by creating a comprehensive inventory of machines, accounts, and potential vulnerabilities. We will look at some of the most useful scanning tools freely available today and run them in numerous hands-on labs to help hammer home the most effective way to use each tool. We will also conduct a deep dive into some of the most useful tools available to pen testers today for formulating packets: Scapy and Netcat. We finish the day covering vital techniques for false-positive reduction so you can focus your findings on meaningful results and avoid the sting of a false positive. And we will examine the best ways to conduct your scans safely and efficiently.

Topics: Tips for Awesome Scanning; Tcpdump for the Pen Tester; Nmap In-Depth: The Nmap Scripting Engine; Version Scanning with Nmap; Vulnerability Scanning with Nessus; False-Positive Reduction; Packet Manipulation with Scapy; Enumerating Users; Netcat for the Pen Tester; Monitoring Services During a Scan

560.3 HANDS ON: Exploitation

In this section, we look at the many kinds of exploits that penetration testers use to compromise target machines, including client-side exploits, service-side exploits, and local privilege escalation. We'll see how these exploits are packaged in frameworks like Metasploit and its mighty Meterpreter. You'll learn in-depth how to leverage Metasploit and the Meterpreter to compromise target environments. We'll also analyze the topic of anti-virus evasion to bypass the target organization's security measures, as well as methods for pivoting through target environments, all with a focus on determining the true business risk of the target organization.

Topics: Comprehensive Metasploit Coverage with Exploits/Stagers/Stages; Strategies and Tactics for Anti-Virus Evasion; In-Depth Meterpreter Analysis, Hands-On; Implementing Port Forwarding Relays for Merciless Pivots; How to Leverage Shell Access of a Target Environment

560.4 HANDS ON: Post-Exploitation and Merciless Pivoting

Once you've successfully exploited a target environment, penetration testing gets extra exciting as you perform post-exploitation, gathering information from compromised machines and pivoting to other systems in your scope. This section of the course zooms in on pillaging target environments and building formidable hands-on command line skills. We'll cover Windows command line skills in-depth, including PowerShell's awesome abilities for post-exploitation. We'll see how we can leverage malicious services and the incredible WMIC toolset to access and pivot through a target organization. We'll then turn our attention to password guessing attacks, discussing how to avoid account lockout, as well as numerous options for plundering password hashes from target machines including the great Mimikatz Kiwi tool. Finally, we'll look at Metasploit's fantastic features for pivoting, including the msfconsole route command.

Topics: Windows Command Line Kung Fu for Penetration Testers; PowerShell's Amazing Post-Exploitation Capabilities; Password Attack Tips; Account Lockout and Strategies for Avoiding It; Automated Password Guessing with THC-Hydra; Retrieving and Manipulating Hashes from Windows, Linux, and Other Systems; Pivoting through Target Environments; Extracting Hashes and Passwords from Memory with Mimikatz Kiwi

560.5 HANDS ON: In-Depth Password Attacks and Web App Pen Testing

In this section of the course, we'll go even deeper in exploiting one of the weakest aspects of most computing environments: passwords. You'll custom-compile John the Ripper to optimize its performance in cracking passwords. You'll look at the amazingly full-featured Cain tool, running it to crack sniffed Windows authentication messages. We'll see how Rainbow Tables really work to make password cracking much more efficient, all hands-on. And we'll cover powerful "pass-the-hash" attacks, leveraging Metasploit, the Meterpreter, and more. We then turn our attention to web application pen testing, covering the most powerful and common web app attack techniques with hands-on labs for every topic we address. We'll cover finding and exploiting cross-site scripting (XSS), cross-site request forgery (XSRF), command injection, and SQL injection flaws in applications such as online banking, blog sites, and more.

Topics: Password Cracking with John the Ripper; Sniffing and Cracking Windows Authentication Exchanges Using Cain; Using Rainbow Tables to Maximum Effectiveness; Pass-the-Hash Attacks with Metasploit and More; Finding and Exploiting Cross-Site Scripting; Cross-Site Request Forgery; SQL Injection; Leveraging SQL Injection to Perform Command Injection; Maximizing Effectiveness of Command Injection Testing

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. You'll apply all of the skills mastered in the course so far in a full-day, hands-on workshop during which you'll conduct an actual penetration test of a sample target environment. We'll provide the scope and rules of engagement, and you'll work with a team to achieve your goal of finding out whether the target organization's Personally Identifiable Information (PII) is at risk. As a final step in preparing you for conducting penetration tests, you'll make recommendations about remediating the risks you identify.

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

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 safely discovers vulnerabilities through both authenticated and unauthenticated scans, and customize the output from such tools to represent the business risk to the organization
- Analyze the output of scanning tools to eliminate false positive reduction with tools including Netcat and Scapy
- Utilize the Windows PowerShell and Linux bash command lines during post-exploitation to plunder target systems for vital information that can further 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
- Evade anti-virus tools using powerful frameworks designed to hide executables
- 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
- Launch web application vulnerability scanners and then manually exploit Cross-Site Request Forgery, Cross-Site Scripting, Command Injection, and SQL Injection to understand the business risk faced by an organization

"This course was tremendously timely and super relevant for my career."
-James Miller, SRA

SEC561

Immersive Hands-On Hacking Techniques

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Tim Medin

Who Should Attend

- Security professionals
- Systems and network administrators
- Incident response analysts
- Forensic analysts
- Penetration testers
- Red and blue team members

To be a top penetration testing professional, you need fantastic hands-on skills for finding, exploiting and resolving vulnerabilities. Top instructors at SANS engineered **SEC561: Intense Hands-on Pen Testing Skill Development** from the ground up to help you get good fast. The course teaches in-depth security capabilities through 80%+ hands-on exercises, maximizing keyboard time on in-class labs and making this SANS' most hands-on course ever. With over 30 hours of intense labs, students experience a leap in their capabilities, as they come out equipped with the practical skills needed to handle today's pen test and vulnerability assessment projects in enterprise environments. Throughout the course, an expert instructor coaches students as they work their way through solving increasingly demanding real-world information security scenarios using skills that they will be able to apply the day they get back to their jobs.

"Hands-down, one of the best SANS courses I have taken. We learned cutting-edge pentesting techniques in a hands-on environment that challenged my abilities and increased my overall knowledge."
-Dave Odom, Bechtel

Topics addressed in the course include:

- Applying network scanning and vulnerability assessment tools to effectively map out networks and prioritize discovered vulnerabilities for effective remediation.
- Manipulating common network protocols to reconfigure internal network traffic patterns, as well as defenses against such attacks.
- Analyzing Windows and Linux systems for weaknesses using the latest enterprise management capabilities of the operating systems, including the super-powerful Windows Remote Management (WinRM) tools.
- Applying cutting-edge password analysis tools to identify weak authentication controls leading to unauthorized server access.
- Scouring through web applications and mobile systems to identify and exploit devastating developer flaws.
- Evading anti-virus tools and bypassing Windows User Account Control to understand and defend against these advanced techniques.
- Honing phishing skills to evaluate the effectiveness of employee awareness initiatives and your organization's exposure to one of the most damaging attack vectors widely used today.

"This course (SEC561) really forces you to think and the format rewards your hard work and dedication to finding the solutions." -Michael Nutbrown, Solers, Inc

People often talk about these concepts, but this course teaches you how to actually do them hands-on and in-depth. SEC561 shows penetration testers, vulnerability assessment personnel, auditors, and operations personnel how to leverage in-depth techniques to get powerful results in every one of their projects. The course is overflowing with practical lessons and innovative tips, all with direct hands-on application. Throughout the course, students interact with brand new and custom-developed scenarios built just for this course on the innovative NetWars challenge infrastructure, which guides students through the numerous hands-on labs providing questions, hints, and lessons learned as they build their skills.

Tim Medin *SANS Certified Instructor*

Tim Medin is a senior technical analyst at Counter Hack, a company devoted to the development of information security challenges for education, evaluation, and competition. Through the course of his career, Tim has performed penetration tests on a wide range of organizations and technologies. Prior to Counter Hack, Tim was a Senior Security Consultant for FishNet Security, where most of his focus was on penetration testing. He gained information security experience in a variety of industries, including previous positions in control systems, higher education, financial services, and manufacturing. Tim regularly contributes to the SANS Penetration Testing Blog (pen-testing.sans.org/blog/) and the Command Line Kung Fu Blog (blog.commandlinekungfu.com). He is also project lead for the Laudanum Project, a collection of injectable scripts designed to be used in penetration testing. @timmedin

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. Students will start by leveraging 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. Students will then turn their attention to performing similar analysis against remote Windows servers using built-in Windows system management tools to detect misconfigured services, identify password guessing attempts and track down the user performing the attack, evaluate the impact of malware attacks and analyze packet capture data. By completing these tasks, students build their systems management skills (applicable to post-compromise system host analysis) as well as their defensive skills (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 students investigate the critical tasks for a high-quality penetration test. We will look at the safest, most efficient ways to map a network and discover target systems and services. Once the systems are discovered, we will search for vulnerabilities and reduce false positives with manual vulnerability verification. We will also examine 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, in order 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 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 that 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 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 rapidly increasing use of mobile devices in enterprise networks, organizations have a growing need to identify expertise in security assessment and penetration testing of mobile devices and their supporting infrastructure. This section will examine the practical vulnerabilities introduced by mobile devices and applications, as well as 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 course 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 will utilize techniques to pivot through compromised systems using various tunneling/pivoting techniques, bypassing anti-virus and built-in commands to extend our influence over the target environment and detect issues that lesser testers may have missed. We will 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

561.6 HANDS ON: Capture-the-Flag Challenge

This lively session is the culmination of the course, giving students the opportunity to apply the skills they have mastered throughout all the other sections in a hands-on workshop. The Capture-the-Flag Challenge is an expanded version of the exercises conducted in the previous sections. The aim is to independently reinforce skills learned throughout the course. Students 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 them by the SANS NetWars Scoring Server. By practicing the skills in a challenging workshop that combines multiple focus areas, participants will be able to explore, exploit, pillage and reinforce skills in a realistic target environment.

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 that lead 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

SEC566

Implementing and Auditing the Critical Security Controls – In-Depth

SANS

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 5:00pm
30 CPEs
Laptop Required
Instructor: James Tarala

giac.org

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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 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.

Who Should Attend

- Information assurance auditors
- System implementers or administrators
- Network security engineers
- IT administrators
- Department of Defense personnel or contractors
- Staff and clients of federal agencies
- 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

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."

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.

James Tarala *SANS Senior Instructor*

James Tarala is a principal consultant with Enclave Security and is based in 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 in developing 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. @isaudit

566.1 HANDS ON: Introduction and Overview of the 20 Critical Controls

Day 1 will introduce you to all of the Critical Controls, laying the foundation for the rest of the class. For each Control, we will follow the same outline covering the following information:

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

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)

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 networks 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 the Controls
- Understand how the Critical Controls map to standards such as NIST 800-53, ISO 27002, the Australian Top 35, and more
- Audit each of the Critical Controls with specific, proven templates, checklists, and scripts provided to facilitate the audit process

"The 20 controls presented in the course are requirements found in most regulated industries. I found the format and layout of each control well explained and easy to follow."
-Josh Ellis, Iberdrola USA

"Topics addressed real-world and current threats – gives great suggestions to assist an organization to better protect their IP space."
-Bill C., Shaw AFB

"I'm leaving the class with a great mindset aimed at evaluating the current environment and controls. SEC566 was good information with a great instructor!"
-Tom Kozelsky, Nexeo Solution

SEC575

Mobile Device Security and Ethical Hacking

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Joshua Wright

giac.org

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WITH THIS COURSE
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Who Should Attend

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

Mobile phones and tablets have become essential to enterprise and government networks ranging from small organizations to Fortune 500 companies and large 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 (ERP) to project management.

For all of its convenience, however, the ubiquitous use of mobile devices in the work place and beyond has brought new security risks. As reliance on these devices has grown exponentially, organizations have quickly recognized that mobile phones and tablets need greater security implementations than a simple screen protector and clever password. Whether an Apple iPhone or iPad, a Windows Phone, or an Android or BlackBerry phone or tablet, these devices have become hugely attractive and vulnerable targets for nefarious attackers. The use of such devices poses an 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.

SEC575: Mobile Device Security and Ethical Hacking is designed to help organizations secure their mobile devices by equipping personnel with the knowledge to design, deploy, operate, and assess a well-managed and safe mobile environment. The course will help you build the critical skills to support your organization's secure deployment and use of mobile phones and tablets. You will learn how to capture and evaluate mobile device network activity, disassemble and analyze mobile code, recognize weaknesses in common mobile applications, and conduct full-scale mobile penetration tests.

You will gain hands-on experience in designing a secure mobile phone network for local and 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.

Joshua Wright *SANS Senior Instructor*

Joshua Wright is a senior technical analyst with Counter Hack, a company devoted to the development of information security challenges for education, evaluation, and competition. Through his experiences as a penetration tester, Josh has worked with hundreds of organizations on attacking and defending mobile devices and wireless systems, ethically disclosing significant product and protocol security weaknesses to well-known organizations. As an open-source software advocate, Josh has conducted cutting-edge research resulting in several software tools that are commonly used to evaluate the security of widely deployed technology targeting WiFi, Bluetooth, and ZigBee wireless systems, smart grid deployments, and the Android and Apple iOS mobile device platforms. As the technical lead of the innovative CyberCity, Josh also oversees and manages the development of critical training and educational missions for cyber warriors in the U.S. military, government agencies, and critical infrastructure providers. @joshwr1ght

575.1 HANDS ON: Device Architecture and Common Mobile Threats

The first part of the course looks at the significant threats affecting mobile phone deployments and how organizations are being attacked through these systems. As a critical component of a secure deployment, we'll examine the architectural and implementational differences between Android, Apple, BlackBerry, and Windows Phone systems, including platform software defenses and application permission management. We'll also look at the specific implementation details of popular platform features such as iBeacon, AirDrop, App Verification and more. We'll apply hands-on exercises to interact with mobile device emulator features including low-level access to installed application services.

Topics: Mobile Problems and Opportunities; Mobile Devices and Infrastructure; Mobile Device Security Models; Mobile Device Lab Analysis Tools; Mobile Device Malware Threats

575.2 HANDS ON: Mobile Platform Access and Application Analysis

With an understanding of the threats, architectural components and desired security methods, we can design incident response processes to mitigate the effect of common threat scenarios, including device loss. We'll look at building such a program, while developing our own skills to analyze mobile device data and applications through rooting and jailbreaking, filesystem data analysis, and network activity analysis techniques.

Topics: Mitigating Stolen Devices; Unlocking, Rooting, Jailbreaking Mobile Devices; Mobile Phone Data Storage and Filesystem Architecture; Network Activity Monitoring

575.3 HANDS ON: Mobile Application Reverse Engineering

One of the critical decisions you will need to make in supporting a mobile device deployment is to approve or disapprove of unique application requests from end-users in a corporate device deployment. With some analysis skills, we can evaluate applications to determine the type of access and information disclosure threats they represent. We'll examine the techniques for reverse-engineering iOS and Android applications, obtaining source code for applications from public app stores. For Android applications we'll look at opportunities to change the behavior of applications as part of our analysis process by decompiling, manipulating, and recompiling code, and adding new code to existing applications without prior source code access. For iOS we'll extract critical app definition information available in all apps to examine and manipulate app behavior through the Cycript tool.

Topics: Static Application Analysis; Automated Application Analysis Systems; Manipulating App Behavior

575.4 HANDS ON: Penetration Testing Mobile Devices – PART 1

An essential component of developing a secure mobile phone deployment is to perform an ethical hacking assessment. Through ethical hacking or penetration testing, we examine the mobile devices and infrastructure from the perspective of an attacker, identifying and exploiting flaws that deliver unauthorized access to data or supporting networks. Through the identification of these flaws we can evaluate the mobile phone deployment risk to the organization with practical, useful risk metrics.

Topics: Fingerprinting Mobile Devices; Wireless Network Probe Mapping; Weak Wireless Attacks; Enterprise Wireless Security Attacks

575.5 HANDS ON: Penetration Testing Mobile Devices – PART 2

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

Topics: Network Manipulation Attacks; Mobile Application Attacks; Web Framework Attacks; Back-end Application Support Attacks

575.6 HANDS ON: Capture the Flag

On the last day of class we'll pull in all the concepts and technology we've covered in the week for a comprehensive Capture-the-Flag (CTF) challenge. During the CTF event, you'll have the option to participate in multiple roles, designing a secure infrastructure for the deployment of mobile phones, monitoring network activity to identify attacks against mobile devices, extracting sensitive data from a compromised iPad, and attacking a variety of mobile phones and related network infrastructure components. In the CTF, you'll use the skills you've built to practically evaluate systems and defend against attackers, simulating the realistic environment you'll be prepared to protect when you get back to the office.

You Will Be Able To

- Use jailbreak tools for Apple iOS and Android systems
- Conduct an analysis of iOS and Android filesystem data to plunder compromised devices and extract sensitive mobile device use information
- Analyze Apple iOS and Android applications with reverse-engineering tools
- Conduct an automated security assessment of mobile applications
- Use wireless network analysis tools to identify and exploit wireless networks used by mobile devices
- Intercept and manipulate mobile device network activity
- Leverage mobile-device-specific exploit frameworks to gain unauthorized access to target devices
- Manipulate the behavior of mobile applications to bypass security restrictions

"Taking this course was a great opportunity to ask an expert all my questions, good broad overview and mobile threats background!"
-Tom G., GovCert UK

"Once again, SANS has exceeded my expectations and successfully re-focused my view of threats and risks. I recommend this course because it is very enlightening."
-Charles Allen, EM Solutions, Inc.

SEC579

Virtualization and Private Cloud Security

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Dave Shackleford

BUNDLE ONDEMAND
WITH THIS COURSE
sans.org/ondemand

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

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 of 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 infrastructure.

"SEC579 was one of the best-produced SANS courses I have taken. The blend of ops and security was extremely valuable." -Scott Towery, Visions

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.

"Great course! Anyone involved with managing virtual system environments will benefit from taking SEC579." -Randall R., Defense Security Services

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.

"Dave is an excellent teacher and communicator. He made a highly technical course interesting and the overall experience was thoroughly enjoyable!"
-Wayne Rosen, Adnet Systems, Inc.

Dave Shackleford *SANS Senior Instructor*

Dave Shackleford is the owner and principal consultant of Voodoo Security and a SANS analyst, senior instructor, and course author. He has consulted with hundreds of organizations in the areas of security, regulatory compliance, and network architecture and engineering, and is a VMware vExpert with 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 the author of the Sybex book *Virtualization Security: Protecting Virtualized Environments*, as well as the coauthor of *Hands-On Information Security* from Course Technology. 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. @daveshackleford

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.

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; Virtual Machine Security Configuration Options

579.2 HANDS ON: Virtualization and 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 an 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; integrate promiscuous interfaces and traffic capture methods into virtual networks; and then set up and configure 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.

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

"SEC579 is the absolute best virtualization security information available! And it is immediately usable."

-Leonard Lyons, Northrop Grumman

579.4 HANDS ON: Virtualization Offense and Defense – PART 2

This session is all about defense! We'll start off with an analysis of 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. Most of this session will focus on incident response and forensics in a virtualized or cloud-based infrastructure. We'll walk students through the six-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 change with the addition of virtualization and cloud technology in the environment. Our first discussion will be a lesson in 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: Auditing and Compliance for 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.

SEC660

Advanced Penetration Testing, Exploit Writing, and Ethical Hacking

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 7:00pm (Days 1-5)
9:00am - 5:00pm (Day 6)
Laptop Required
46 CPEs
Instructor: Stephen Sims

giac.org

sans.edu

sans.org/cyber-guardian

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WITH THIS COURSE
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Who Should Attend

- Network and systems penetration testers
- Incident handlers
- Application developers
- IDS engineers

This course is designed as a logical progression point for those who have completed **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, you need a strong desire to learn, the support of others, and the opportunity to practice and build experience. 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 the advanced penetration concept, and provides 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 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.

Stephen Sims *SANS Senior Instructor*

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 performing reverse engineering, exploit development, threat modeling, and penetration testing. Stephen has an MS in information assurance from Norwich University and is a course author and senior instructor for the SANS Institute. He is the author of SANS' only 700-level course, SEC760: Advanced Exploit Development for Penetration Testers, which concentrates on complex heap overflows, patch diffing, and client-side exploits. Stephen is also the lead author of 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. @Steph3nSims

660.1 HANDS ON: Network Attacks for Penetration Testers

Day one serves as an advanced network attack module, building on knowledge gained from SEC560. 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 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: Pen Testing Cryptographic Implementations; Exploiting CBC Bit Flipping Vulnerabilities; Exploiting Hash Length Extension Vulnerabilities; Delivering Malicious Operating Systems to Devices Using Network Booting and PXE; PowerShell Essentials; Enterprise PowerShell; Post Exploitation with PowerShell and Metasploit; Escaping Software Restrictions; Two-hour Evening Capture-the-Flag Exercise Using PXE, Network Attacks, and Local Privilege Escalation

660.3 HANDS ON: Python, Scapy, and Fuzzing

Day three 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 Paimei

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 SEC660 course was a very eye-opening experience. The theory and concepts were equally covered in the practical exercises which I have never seen in other courses."

-Faisal Al Mansour, Saudi Aramco

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. 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.

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 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.

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 Challenge

This day will serve as a real-world challenge for students, requiring them to utilize skills learned 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.

FOR408 Windows Forensic Analysis

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Chad Tilbury

giac.org

sans.edu

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digital-forensics.sans.org

SIMULCAST
SEE PAGE 72 FOR INFO

Who Should Attend

- Information technology professionals
- Incident response team members
- Law enforcement officers, federal agents, and detectives
- Media exploitation analysts
- Anyone interested in a deep understanding of Windows forensics

All organizations must prepare for cyber crime occurring on their computer systems and within their networks. Demand has never been higher for analysts who can investigate crimes like fraud, insider threats, industrial espionage, employee misuse, and computer intrusions. Government agencies increasingly require trained media exploitation specialists to recover key intelligence from Windows systems. To help solve these cases, SANS is training a new cadre of the world's best digital forensic professionals, incident responders, and media exploitation masters capable of piecing together what happened on computer systems second by second.

FOR408: Windows Forensic Analysis focuses on building in-depth digital forensics knowledge of the Microsoft Windows operating systems. You can't protect what you don't understand, and understanding forensic capabilities and artifacts is a core component of information security. You'll learn to recover, analyze, and authenticate forensic data on Windows systems. You'll understand how to track detailed user activity on your network and how to organize findings for use in incident response, internal investigations, and civil/criminal litigation. You'll be able to use your new skills to validate security tools, enhance vulnerability assessments, identify insider threats, track hackers, and improve security policies. Whether you know it or not, Windows is silently recording an unimaginable amount of data about you and your users. FOR408 teaches you how to mine this mountain of data.

Proper analysis requires real data for students to examine. The completely updated FOR408 course trains digital forensic analysts through a series of new hands-on laboratory exercises that incorporate evidence found on the latest Microsoft technologies (Windows 7, Windows 8/8.1, Office and Office365, cloud storage, Sharepoint, Exchange, Outlook). Students leave the course armed with the latest tools and techniques and prepared to investigate even the most complicated systems they might encounter. Nothing is left out – attendees learn to analyze everything from legacy Windows XP systems to just-discovered Windows 8.1 artifacts.

FOR408 is continually updated. This course utilizes a brand-new intellectual property theft and corporate espionage case that took over six months to create. You work in the real world and your training should include real practice data. Our development team used incidents from their own experiences and investigations and created an incredibly rich and detailed scenario designed to immerse students in a true investigation. The case demonstrates the latest artifacts and technologies an investigator might encounter while analyzing Windows systems. The incredibly detailed step-by-step workbook details the tools and techniques that each investigator should follow to solve a forensic case.

MASTER WINDOWS FORENSICS – YOU CAN'T PROTECT WHAT YOU DON'T UNDERSTAND

Chad Tilbury *SANS Senior Instructor*

Chad Tilbury has been responding to computer intrusions and conducting forensic investigations since 1998. 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 U.S. 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 60 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. @chadtilbury

408.1 HANDS ON: Windows Digital Forensics and Advanced Data Triage

The Windows forensics course starts with an examination of digital forensics in today's interconnected environments and discusses challenges associated with mobile devices, tablets, cloud storage, and modern Windows operating systems. We will discuss how modern hard drives, such as Solid State Devices (SSD), can affect the digital forensics acquisition process and how analysts need to adapt to overcome the introduction of these new technologies.

Topics: Windows Operating System Components; Core Forensic Principles; Live Response and Triage-Based Acquisition Techniques; Acquisition Review with Write Blocker; Advanced Acquisition Challenges; Windows Image Mounting and Examination; FAT and NTFS File System Overview; Key Word Searching and Forensics Suites (FTK, EnCase, and Autopsy); Document and File Metadata; File Carving

408.2 HANDS ON: CORE WINDOWS FORENSICS PART 1 – Windows Registry Forensics and Analysis

Our journey continues with the Windows Registry, where the digital forensic investigator will learn how to discover critical user and system information pertinent to almost any investigation. Each examiner will learn how to navigate and examine the Registry to obtain user-profile data and system data. The course teaches forensic investigators how to prove that a specific user performed key word searches, ran specific programs, opened and saved files, perused folders, and used removable devices.

Topics: Registry Basics; Profile Users and Groups; Core System Information; User Forensic Data; External and Bring Your Own Device (BYOD) Forensic Examinations; Tools Utilized

408.3 HANDS ON: CORE WINDOWS FORENSICS PART 2 – USB Devices, Shell Items, and Key Word Searching

Being able to show the first and last time a file was opened is a critical analysis skill. Utilizing shortcut (LNK) and jumplist databases, we are able to easily pinpoint which file was opened and when. We will demonstrate how to examine the pagefile, system memory, and unallocated space, all difficult-to-access locations that can offer the critical data for your case.

Topics: Shell Item Forensics; USB and Bring Your Own Device (BYOD); Key Word Searching and Forensics Suites (AccessData's FTK, Guidance Software's EnCase)

408.4 HANDS ON: CORE WINDOWS FORENSICS PART 3 – Email, Key Additional Artifacts, and Event Logs

This section discusses what types of information can be relevant to an investigation, where to find email files, and how to use forensic tools to facilitate the analysis process. We will find that the analysis process is similar across different types of email stores, but the real work takes place in the preparation – finding and extracting the email files from a variety of different sources. The last part of the section will arm each investigator with the core knowledge and capability to maintain this crucial skill for many years to come.

Topics: Email Forensics; Forensicating Additional Windows OS Artifacts; Windows Event Log Analysis

408.5 HANDS ON: CORE WINDOWS FORENSICS PART 4 – Web Browser Forensics: Firefox, Internet Explorer, and Chrome

Throughout the section, investigators will use their skills in real hands-on cases, exploring evidence created by Chrome, Firefox, and Internet Explorer along with Windows Operating System artifacts.

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

408.6 HANDS ON: Windows Forensic Challenge

This complex case will involve an investigation into one of the most recent versions of the Windows Operating System. The evidence is real and provides the most realistic training opportunity currently available. Solving the case will require that students use all of the skills gained from each of the previous sections.

Topics: Digital Forensic Case; Mock Trial

"I have been doing forensic investigations for several years, but would highly recommend this course (FOR408) for both new and old forensic investigations."

-Robert Galarza, JP Morgan Chase

You Will Be Able To

- Perform proper Windows forensic analysis by applying key techniques focusing on Windows 7/8/8.1
- Use full-scale forensic tools and analysis methods to detail nearly every action a suspect accomplished on a Windows system, including who placed an artifact on the system and how, program execution, file/folder opening, geo-location, browser history, profile USB device usage, and more
- Uncover the exact time that a specific user last executed a program through Registry and Windows artifact analysis, and understand how this information can be used to prove intent in cases such as intellectual property theft, hacker-breached systems, and traditional crimes
- Determine the number of times files have been opened by a suspect through browser forensics, shortcut file analysis (LNK), e-mail analysis, and Windows Registry parsing
- Use automated analysis techniques via AccessData's Forensic ToolKit (FTK), Nuix, and Internet Evidence Finder (IEF)
- Identify keywords searched by a specific user on a Windows system in order to pinpoint the files and information the suspect was interested in finding and accomplish detailed damage assessments
- Use Windows shellbags analysis tools to articulate every folder and directory that a user opened up while browsing local, removable, and network drives
- Determine each time a unique and specific USB device was attached to the Windows system, the files and folders that were accessed on it, and who plugged it in by parsing key Windows artifacts such as the Registry and log files
- Use event log analysis techniques to determine when and how users logged into a Windows system, whether via a remote session, at the keyboard, or simply by unlocking a screensaver
- Determine where a crime was committed using registry data to pinpoint the geo-location of a system by examining connected networks and wireless access points
- Use free browser forensic tools to perform detailed web browser analysis, parse raw SQLite and ESE databases, and leverage session recovery artifacts and flash cookies to identify the web activity of suspects, even if privacy cleaners and in-private browsing are used

FOR508

Advanced Digital Forensics and Incident Response

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Rob Lee

giac.org

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MEETS DoDD 8570 REQUIREMENTS

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digital-forensics.sans.org

DAY 0: A 3-letter government agency contacts you to say critical information was stolen through a targeted attack on your organization. They won't tell how they know, but they identify several breached systems within your enterprise. An Advanced Persistent Threat adversary, aka an APT, is likely involved – the most sophisticated threat you are likely to face in your efforts to defend your systems and data.

FOR508: Advanced Digital Forensics and Incident Response will help you determine:

- How the breach occurred
- How systems were affected and compromised
- What attackers took or changed
- How to contain and mitigate the incident

Over 80% of all breach victims learn of a compromise from third-party notifications, not from internal security teams. In most cases, adversaries have been rummaging through your network undetected for months or even years.

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
- Security Operations Center (SOC) personnel and information security practitioners
- SANS FOR408 and SEC504 graduates

"FOR508 has been the best DFIR course I've taken so far. All the material is recent and it shows a lot of time went into the material." -Louise Cheung, Stroz Friedberg

Incident response tactics and procedures have evolved rapidly over the past several years. Data breaches and intrusions are growing more complex. Adversaries are no longer compromising one or two systems in your enterprise; they are compromising hundreds. Your team can no longer afford antiquated incident response techniques that fail to properly identify compromised systems, provide ineffective containment of the breach, and ultimately fail to rapidly remediate the incident.

This in-depth incident response course provides responders with advanced skills to hunt down, counter, and recover from a wide range of threats within enterprise networks, including APT adversaries, organized crime syndicates, and hactivism. Constantly updated, FOR508 addresses today's incidents by providing hands-on incident response tactics and techniques that elite responders are successfully using in real-world breach cases.

GATHER YOUR INCIDENT RESPONSE TEAM – IT'S TIME TO GO HUNTING!

Rob Lee *SANS Faculty Fellow*

Rob Lee is an entrepreneur and consultant in the Washington, DC 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 seven 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 vulnerability discovery and exploit development teams, 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." @robtlee & @sansforensics

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 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 APT groups or crime syndicate groups that propagate through thousands of systems.

Topics: Real Incident Response Tactics; Threat and Adversary Intelligence; Intrusion Digital Forensics Methodology; Remote and Enterprise IR System Analysis; Windows Live Incident Response

508.2 HANDS ON: Memory Forensics in Incident Response

Now a critical component of many incident response teams that detect advanced threats in their 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. Memory analysis traditionally was solely the domain of Windows internals experts, but the recent development of new tools makes it accessible today to anyone, especially incident responders. 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 capabilities.

Topics: Memory Acquisition; Memory Forensics Analysis Process; Memory Forensics Examinations; Memory Analysis Tools

508.3 HANDS ON: Timeline Analysis

Learn advanced incident response techniques uncovered via timeline analysis directly from the developers who pioneered timeline analysis tradecraft. Temporal data are located everywhere on a computer system. File system 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. Pioneered by Rob Lee in 2001, timeline analysis has become a critical incident response and forensics technique to solve complex 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.

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 they use tools that simply require a few mouse clicks to 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: Advanced "Evidence of Execution" Artifacts; 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; Anti-Forensic Detection Methodologies

508.5 HANDS ON: Adversary and Malware Hunting

Over the years, we have observed that many incident responders have a challenging time finding malware without pre-built indicators of compromise 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 identify 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. The section concludes with a step-by-step approach to handling some of the most difficult types of investigations.

Topics: Adversary and Malware Hunting; Methodology to Analyze and Solve Challenging Cases

508.6 HANDS ON: The APT Incident Response Challenge

This incredibly rich and realistic enterprise intrusion exercise is based on a real-world advanced persistent threat (APT) group. It brings together techniques learned earlier in the week and tests your newly acquired skills in a case that simulates an attack by an advanced adversary. The challenge brings it all together using a real intrusion into a complete Windows enterprise environment. 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 attacks, curated by a cadre of instructors with decades of experience fighting advanced threats from attackers ranging from nation-states to financial crime syndicates and hactivist groups.

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 hackivists
- 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 beachhead and spear phishing attack mechanisms, lateral movement, and data exfiltration techniques
- Use the SIFT Workstation's capabilities, and 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 the attacker has 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 $I30 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, and recover artifacts hidden by anti-forensic techniques such as timestomping, file wiping, rootkit hiding, and privacy cleaning
- Discover an adversary's persistent mechanisms to allow malware to continue to run on a system after a reboot using command-line tools such as autorunsc, psexec, jobparser, group policy, triage-ir, and IOCFinder

FOR572 Advanced Network Forensics and Analysis

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Philip Hagen

giac.org

sans.edu

BUNDLE ONDEMAND
WITH THIS COURSE
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digital-forensics.sans.org

Who Should Attend

- Incident response team members and forensicators
- Law enforcement officers, federal agents, and detectives
- Information security managers
- Network defenders
- IT professionals
- Network engineers
- IT lawyers and paralegals
- Anyone interested in computer network intrusions and investigations
- Security Operations Center personnel and information security practitioners

Forensic casework that does not include a network component is a rarity in today's environment. Performing disk forensics will always be a critical and foundational skill for this career, but overlooking the network component of today's computing architecture is akin to ignoring security camera footage of a crime as it was committed. Whether you handle an intrusion incident, data theft case, or employee misuse scenario, the network often has an unparalleled view of the incident. Its evidence can provide the proof necessary to show intent, or even definitively prove that a crime actually occurred.

"FOR572 was an excellent course that kept my attention and it will be immediately useful when I get back to work."
-John Ives, UC Berkeley

FOR572: Advanced Network Forensics and Analysis was built from the ground up to cover the most critical skills needed to mount efficient and effective post-incident response investigations. We focus on the knowledge necessary to expand the forensic mindset from residual data on the storage media from a system or device to the transient communications that occurred in the past or continue to occur. Even if the most skilled remote attacker compromised a system with an undetectable exploit, the system still has to communicate over the network. Without command-and-control and data extraction channels, the value of a compromised computer system drops to almost zero. Put another way: ***Bad guys are talking – we'll teach you to listen.***

This course covers the tools, technology, and processes required to integrate network evidence sources into your investigations, with a focus on efficiency and effectiveness. You will leave this week with a well-stocked toolbox and the knowledge to use it on your first day back on the job. We will cover the full spectrum of network evidence, including high-level NetFlow analysis, low-level pcap exploration, ancillary network log examination, and more. We cover how to leverage existing infrastructure devices that may contain months or years of valuable evidence, as well as how to place new collection platforms while an incident is already under way.

Whether you are a consultant responding to a client's site, a law enforcement professional assisting victims of cyber crime and seeking prosecution of those responsible, or an on-staff forensic practitioner, this course offers hands-on experience with real-world scenarios that will help take your work to the next level. Previous SANS security curriculum students and other network defenders will benefit from the FOR572 perspective on security operations as they take on more incident response and investigative responsibilities. SANS forensics alumni from FOR408 and FOR508 can take their existing knowledge and apply it directly to the network-based attacks that occur daily. In FOR572, we solve the same caliber of real-world problems without any convenient hard drive or memory images.

The hands-on exercises in this class cover a wide range of tools, including the venerable tcpdump and Wireshark for packet capture and analysis; commercial tools from Splunk, NetworkMiner, and SolarWinds; and open-source tools including nfdump, tcpxtract, ELSA, and more. Through all of these exercises, your shell scripting abilities will come in handy to make easy work of ripping through hundreds and thousands of data records.

Philip Hagen *SANS Certified Instructor*

Philip Hagen has been working in the information security field since 1998, running the full spectrum including deep technical tasks, management of an entire computer forensic services portfolio, and executive responsibilities. Currently, Phil is an Evangelist at Red Canary, where he engages with current and future customers of Red Canary's managed threat detection service to ensure their use of the service is best aligned for success in the face of existing and future threats. Phil started his security career while attending the U.S. Air Force Academy, with research covering both the academic and practical sides of security. He served in the Air Force as a communications officer at Beale AFB and the Pentagon. In 2003, Phil became a government contractor, providing technical services for various IT and information security projects. These included systems that demanded 24x7x365 functionality. He later managed a team of 85 computer forensic professionals in the national security sector. He has provided forensic consulting services for law enforcement, government, and commercial clients prior to joining the Red Canary team. Phil is the course lead and co-author of FOR572: Advanced Network Forensics and Analysis. @PhilHagen

572.1 HANDS ON: Off the Disk and Onto the Wire

Network data can be preserved, but only if captured directly from the wire. Whether tactical or strategic, packet capture methods are quite basic. You will re-acquaint yourself with tcpdump and Wireshark, the most common tools used to capture and analyze network packets, respectively. However, since long-term full-packet capture is still uncommon in most environments, many artifacts that can tell us about what happened on the wire in the past come from devices that manage network functions. You will learn about what kinds of devices can provide valuable evidence and at what level of granularity. We will walk through collecting evidence from one of the most common sources of network evidence, a web proxy server, then you'll go hands-on to find and extract stolen data from the proxy yourself. The Linux SIFT virtual machine, which has been specifically loaded with a set of network forensic tools, will be your primary toolkit for the week.

Topics: Web Proxy Server Examination, Payload Reconstruction, Foundational Network Forensics Tools: tcpdump and Wireshark, Network Evidence Types and Sources, Network Architectural Challenges and Opportunities, Packet Capture Applications and Data

572.2 HANDS ON: NetFlow Analysis, Commercial Tools, and Visualization

In this section, you will learn what data items NetFlow can provide, and the various means of collecting those items. As with many such monitoring technologies, both commercial and open-source solutions exist to query and examine NetFlow data. We will review both categories and discuss the benefits and drawbacks of each. Finally, we will address the forensic aspects of wireless networking. We will cover similarities with and differences from traditional wired network examination, as well as what interesting artifacts can be recovered from wireless protocol fields. Some inherent weaknesses of wireless deployments will also be covered, including how attackers can leverage those weaknesses during an attack, and how they can be detected.

Topics: NetFlow Analysis and Collection; Open-Source Flow Tools, Commercial Network Forensics; Visualization Techniques and Tools; Dynamic Host Configuration Protocol (DHCP) and Domain Name Service (DNS)

572.3 HANDS ON: Network Protocols and Wireless Investigations

This section covers some of the most common and fundamental network protocols that you will likely face during an investigation. We will cover a broad range of protocols including the Dynamic Host Configuration Protocol, which glues together layers two and three on the OSI model, and Microsoft's Remote Procedure Call protocol, which provides all manners of file, print, name resolution, authentication, and other services.

Topics: Hypertext Transfer Protocol (HTTP); Network Time Protocol (NTP); File Transfer Protocol (FTP); Wireless Network Forensics; Simple Mail Transfer Protocol (SMTP); Microsoft Protocols

572.4 HANDS ON: Logging, OPSEC, and Footprint

In this section, you will learn about various logging mechanisms available to both endpoint and network transport devices. You will also learn how to consolidate log data from multiple sources, providing a broad corpus of evidence in one location. As the volume of log data increases, so does the need to consider automated analytic tools. You will learn various solutions that accomplish this, from tactical to enterprise-scale.

Topics: Syslog; Microsoft Event Logging; HTTP Server Logs; Firewall and Intrusion Detection Systems; Log Data Collection, Aggregation, and Analysis; Investigation OPSEC and Footprint Considerations

You Will Be Able To

- Extract files from network packet captures and proxy cache files, allowing follow-on malware analysis or definitive data loss determination
- Use historical NetFlow data to identify relevant past network occurrences, allowing accurate incident scoping
- Reverse-engineer custom network protocols to identify an attacker's command-and-control abilities and actions
- Decrypt captured SSL traffic to identify attackers' actions and what data they extracted from the victim
- Use data from typical network protocols to increase the fidelity of the investigation's findings
- Identify opportunities to collect additional evidence based on the existing systems and platforms within a network architecture
- Examine traffic using common network protocols to identify patterns of activity or specific actions that warrant further investigation
- Incorporate log data into a comprehensive analytic process, filling knowledge gaps that may be far in the past
- Learn how attackers leverage man-in-the-middle tools to intercept seemingly secure communications
- Examine proprietary network protocols to determine what actions occurred on the endpoint systems
- Analyze wireless network traffic to find evidence of malicious activity
- Use visualization tools and techniques to distill vast, complex data sources into management-friendly reports
- Learn how to modify configuration on typical network devices such as firewalls and intrusion detection systems to increase the intelligence value of their logs and alerts during an investigation
- Apply the knowledge you acquire during the week in a full-day capstone exercise, modeled after real-world nation-state intrusions

572.5 HANDS ON: Encryption, Protocol Reversing, and Automation

Encryption is frequently cited as the most significant hurdle to effective network forensics, and for good reason. When properly implemented, encryption can be a brick wall in between an investigator and critical answers. However, technical and implementation weaknesses can be used to our advantage. Even in the absence of these weaknesses, the right analytic approach to encrypted network traffic can still yield valuable information about the content. We will discuss the basics of encryption and how to approach it during an investigation. The section will also cover flow analysis to characterize encrypted conversations.

Topics: Dealing with Encoding and Encryption; Man-in-the-Middle; Encrypted Traffic Flow Analysis; Secure HTTP (HTTPS) and Secure Sockets Layer (SSL); Network Protocol Reverse Engineering; Automated Tools and Libraries

572.6 HANDS ON: Network Forensics Capstone Challenge

This section will combine all of what you have learned during this week. In groups, you will examine network evidence from a real-world compromise by an advanced attacker. Each group will independently analyze data, form and develop hypotheses, and present findings. No evidence from endpoint systems is available – only the network and its infrastructure.

Topics: Network Forensic Case

FOR578 Cyber Threat Intelligence

SANS

NEW!

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 5:00pm
30 CPEs
Laptop Required
Instructor: Jake Williams

DFIR
digital-forensics.sans.org

"I absolutely loved this class! [A] great framework for CTI that I will use to be more effective."
-Nate DeWitt, eBay, Inc.

"Jake Williams is very good. Enjoyed all the real-life stories/situations and awareness."
-Riaz Ahmed, ITT

Make no mistake: current computer network defense and incident response contain a strong element of intelligence and counterintelligence that analysts must understand and leverage in order to defend their computers, networks, and proprietary data.

FOR578: Cyber Threat Intelligence will help network defenders and incident responders:

- Construct and exploit threat intelligence to detect, respond, and defeat advanced persistent threats (APTs)
- Fully analyze successful and unsuccessful intrusions by advanced attackers
- Piece together intrusion campaigns, threat actors, and nation-state organizations
- Manage, share, and receive intelligence on APT adversary groups
- Generate intelligence from their own data sources and share it accordingly
- Identify, extract, and leverage intelligence from APT intrusions
- Expand upon existing intelligence to build profiles of adversary groups
- Leverage intelligence to better defend against and respond to future intrusions.

Who Should Attend

- Incident response team members
- Experienced digital forensic analysts
- Security Operations Center personnel and information security practitioners
- Federal agents and law enforcement officials
- SANS FOR408, FOR572, FOR508, or FOR610 graduates looking to take their skills to the next level

Conventional network defenses such as intrusion detection systems and anti-virus tools focus on the vulnerability component of risk, and traditional incident response methodology pre-supposes a successful intrusion. However, the evolving sophistication of computer network intrusions has rendered these approaches insufficient to address the threats faced by modern networked organizations. Today's adversaries accomplish their goals using advanced tools and techniques designed to circumvent most conventional computer network defense mechanisms, go undetected during the intrusion, and then remain undetected on networks over long periods of time.

The collection, classification, and exploitation of knowledge about adversaries – collectively known as **cyber threat intelligence** – gives network defenders information superiority that can be used to reduce the adversary's likelihood of success with each subsequent intrusion attempt. Responders need accurate, timely, and detailed information to monitor new and evolving attacks, as well as methods to exploit this information to put in place an improved defensive posture. Threat intelligence thus represents a force multiplier for organizations looking to update their response and detection programs to deal with increasingly sophisticated advanced persistent threats.

During a targeted attack, an organization needs a top-notch and cutting-edge incident response armed with the critical intelligence necessary to understand how adversaries operate and to combat the threat. FOR578: Cyber Threat Intelligence will train you and your team to determine, scope, and select resilient courses of action in response to such intrusions and data breaches.

THERE IS NO TEACHER BUT THE ENEMY!

Jake Williams *SANS Certified Instructor*

Jake Williams is a Principal Consultant at Rendition Infosec. He has more than a decade of experience in secure network design, penetration testing, incident response, forensics, and malware reverse engineering. Before founding Rendition Infosec, Jake worked with various cleared government agencies in information security roles. He is well versed in cloud forensics and previously developed a cloud forensics course for a U.S. government client. Jake regularly responds to cyber intrusions performed by state-sponsored actors in financial, defense, aerospace, and healthcare sectors using cutting-edge forensics and incident response techniques. He often develops custom tools to deal with specific incidents and malware reversing challenges. Additionally, Jake performs exploit development and has privately disclosed a multitude of zero day exploits to vendors and clients. He found vulnerabilities in one of the state counterparts to healthcare.gov and recently exploited antivirus software to perform privilege escalation. Jake developed Dropsmack, a pentesting tool (okay, malware) that performs command and control and data exfiltration over cloud file sharing services. Jake also developed an anti-forensics tool for memory forensics, Attention Deficit Disorder (ADD). This tool demonstrated weaknesses in memory forensics techniques. @MalwareJake

578.1 HANDS ON: Cyber Threat Intelligence for Intrusions

A key facilitator of cyber threat intelligence (CTI) is to use a common lexicon that defines its most basic elements and ideas. This section introduces students to fundamental CTI concepts and models, beginning with an understanding of broader intelligence analysis tradecraft. The section introduces and defines CTI through conventional lectures, class participation, and exercises from the students' lab book.

Topics: Course Introduction; Current Threat Landscape; Classic Intelligence Analysis; Intelligence in Computer Network Defense; Diamond Model; Kill Chain Introduction and Background; Kill Chain Phases in Detail; Analytical Aspects of the Kill Chain; Courses of Action Matrix; Indicator Lifecycle; Indicator Maturity Model; Decision-making in Intelligence Exploitation; Additional, Alternate, and Emergent Models

578.2 HANDS ON: Kill Chain for Computer Network Defense

One of the most commonly used and basic models covered in the first section is the "kill chain," which is the series of steps an adversary must accomplish to be successful. This section will use the kill chain as a guide to collect intelligence on the sophisticated adversary involved in a multi-phase intrusion, from initial discovery of command-and-control to completion of analysis of the event. The section also draws on other models introduced in Section 1, such as the Courses of Action Matrix, to show students their proper role in analyzing a successful intrusion as they methodically work their way toward being able to define a full campaign using the concepts introduced here.

Topics: Scenario-based Kill Chain Analysis: Web Drive-by; Application of Courses of Action for Computer Network Defense; Analytical Completeness Guided by Kill Chain Analysis; Multi-Stage Intrusions and Kill Chain Sequencing; Second Scenario-based Kill Chain Analysis: Webserver Intrusion; Historical Unsuccessful Intrusion Attempt: Phishing Attempt; Completing the Picture with Available Intelligence

578.3 HANDS ON: Campaigns and Open-Source Pivoting

An intrusion is but a single attempt by an adversary to gain access to a system for some intended purpose. Dedicated adversaries, intent on exploiting systems that support specific organizations, people, or technologies, will not let one failed attempt deter them from their ultimate goal. Their sustained campaign will likely consist of multiple intrusions over an extended period of time, each with its individual kill chain, against organizations you monitor and defend as well as others beyond your visible spectrum. In this section, students learn what campaigns are, why they are important, and how to define them. From this baseline intelligence, gaps and collection opportunities are identified for fulfillment via open-source resources and methods. Common types and implementations of open-source data repositories, as well as their use, are explored in-depth through classroom discussion and exercises. These resources can produce an enormous volume of intelligence about intrusions, which may contain obscure patterns that further elucidate campaigns or actors. Tools and techniques to expose these patterns within the data through higher-order analysis will be demonstrated in narrative and exercise form. The application of the resulting intelligence will be articulated for correlation, courses of action, campaign assembly, and more.

Topics: Abbreviated History of Threats in Cyberspace; Cross-Incident Correlation; Campaign Definitions; Distinguishing Correlative and Actionable Intelligence Pitfalls in Correlating Intrusions Interpreting Campaign Intersections Pivoting, Hunting, and External Intelligence Exploitation; Exploratory Techniques for Campaign Analysis

578.4 HANDS ON: Organizations, Nation-States, and Higher-Order Analysis

Behind campaigns are people, and just like network defenders and intelligence analysts, these intruders have roles within organizations, employers, bosses, customers, and colleagues. This section will explore in more depth the characteristics of the organizational entities behind intrusions, and how these characteristics are projected through intrusions. Cognitive biases common in the CTI domain are discussed. Analysis of Competing Hypotheses is then presented as a formal method for mitigating bias in intelligence assessments in general, then for nation-state and (separately) campaign attribution. Intent, opportunity, and capability are revisited from Section 1 in greater detail, particularly as they pertain to nation-state actors. The role and significance of nation-state attribution in Cyber Threat Intelligence analysis is discussed as a general concept, with examples from contemporaneous nation-state threats. Finally, an abridged history of threats in cyberspace that marked inflection points particularly significant for the CTI domain is provided.

Topics: Formulating Conclusions; Cognitive Biases & Analysis of Competing Hypotheses (ACH); Nation-State Attribution; Understanding Threats and Their Actions at the Strategic and Operational Level; Abridged History of Threats in Cyberspace Influencing the CTI Domain

578.5 HANDS ON: Collecting, Sharing, and Actuating Intelligence

Intrusions consist of an enormous amount of information that, once refined, represents intelligence. In this section, students will learn effective ways to manage intelligence, collaborate with their peers, and empower their security teams. Campaigns consist of intrusions spanning months and sometimes even years, each with its own details linking its constituent intrusions. Collecting this intelligence is critical to making it actionable for defense, and appropriately sharing it with internal and peer organization security teams makes it possible to identify the resilient characteristics of adversaries and discover new campaigns. Intrusions will span organizations, and sometimes even spread across industries. External intelligence is key to keep up to date on the latest movements and tactics of adversaries, even if they are not (yet!) targeting you.

Topics: Intelligence Sharing Purposes and Considerations; Extracting Tactical Threat Intelligence; Open-Source Intelligence Collection (OSINT); Commercial and Open-Source CTI Solutions; Intelligence Knowledge Management; Internal Threat Intel Sharing; Peer Collaboration; Report Writing

FOR585 Advanced Smartphone Forensics

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Heather Mahalik

DFIR
digital-forensics.sans.org

"FOR585 course content is extremely valuable for use in real-world application and directly pertinent to analysis conducted at my lab. It's great to go to a class and be able to utilize nearly everything that was taught."
-H. Polend, Virginia Dept. of Forensic Science

It is almost impossible today to conduct a digital forensic investigation that does not include a smartphone or mobile device. Smartphones are replacing the need for a personal computer, and almost everyone owns at least one. The smartphone may be the only source of digital evidence tracing an individual's movements and motives, and thus can provide the who, what, when, where, why, and how behind a case. FOR585: Advanced Smartphone Forensics teaches real-life, hands-on skills that help digital forensic examiners, law enforcement officers, and information security professionals handle investigations involving even the most complex smartphones currently available.

The course focuses on smartphones as sources of evidence, providing students with the skills needed to handle mobile devices in a forensically sound manner, manipulate locked devices, understand the different technologies, discover malware, and analyze the results for use in digital investigations by diving deeper into the file systems of each smartphone. Students will be able to obtain actionable intelligence and recover and analyze data that commercial tools often miss for use in internal investigations, criminal and civil litigation, and security breach cases. Students will walk away with knowledge they can immediately put to use on their next smartphone investigation.

Who Should Attend

- Experienced digital forensic analysts who want to extend their knowledge and experience to forensic analysis of mobile devices, especially smartphones
- Media exploitation analysts who need to master Tactical Exploitation or Document and Media Exploitation (DOMEX) operations on smartphones and mobile devices by learning how individuals used their smartphones, who they communicated with, and what files they accessed
- Information security professionals who respond to data breach incidents and intrusions
- Incident response teams tasked with identifying the role that smartphones played in a breach
- Law enforcement officers, federal agents, and detectives who want to master smartphone forensics and expand their investigative skills beyond traditional host-based digital forensics
- IT auditors who want to learn how smartphones can expose sensitive information
- SANS SEC575, FOR408, FOR518, and FOR508 graduates looking to take their skills to the next level

YOUR TEXTS AND APPS CAN AND WILL BE USED AGAINST YOU!

The hands-on exercises in this course cover the best commercial and open-source tools available to conduct smartphone and mobile device forensics, and provide detailed instructions on how to manually decode data that tools sometimes overlook. The course will prepare you to recover and reconstruct events relating to illegal or unauthorized activities, determine if a smartphone has been compromised with malware or spyware, and provide your organization with the capability to use evidence from smartphones.

This intensive six-day course will take your mobile device forensics knowledge and abilities to the next level. Smartphone technologies are constantly changing, and most forensics professionals are unfamiliar with the data formats. It is time for the good guys to get smarter and for the bad guys to know that ***their texts and apps can and will be used against them!***

Heather Mahalik *SANS Senior Instructor*

Heather Mahalik is a project manager for Ocean's Edge, where she uses her experience to manage projects focused on wireless cybersecurity and mobile application development. Heather has over 12 years of experience in digital forensics, vulnerability discovery of mobile devices, application reverse engineering and manual decoding. She is currently the course lead for FOR585: Advanced Smartphone Forensics. Previously, Heather headed the mobile device team for Basis Technology, where she led the mobile device exploitation efforts in support of the U.S. government. She also worked as a forensic examiner at Stroz Friedberg and the U.S. State Department Computer Investigations and Forensics Lab, where she focused her efforts on high-profile cases. Heather co-authored Practical Mobile Forensics and various white papers, and has presented at leading conferences and instructed classes focused on Mac forensics, mobile device forensics, and computer forensics to practitioners in the field. Heather blogs and hosts work from the digital forensics community at www.smarterforensics.com. @HeatherMahalik

585.1 HANDS ON: Smartphone Overview and Malware Forensics

Although smartphone forensics concepts are similar to those of digital forensics, smartphone file system structures require specialized decoding skills to correctly interpret the data acquired from the device. On the first course day students will apply what they already know to smartphone forensics handling, device capabilities, acquisition methods and data encoding concepts of smartphone components. Students will also become familiar with the forensics tools required to complete comprehensive examinations of smartphone data structures. Malware affects a plethora of smartphone devices. This section will examine various types of malware, how it exists on smartphones and how to identify it.

Topics: Introduction to Smartphones; Smartphone Handling; Forensic Acquisition of Smartphones; Smartphone Forensics Tool Overview; Smartphone Components; The SIFT Workstation; Malware and Spyware Forensics; JTAG Forensics

585.2 HANDS ON: Android Forensics

Android devices are among the most widely used smartphones in the world, which means they will surely be part of an investigation that will come across your desk. Android devices contain substantial amounts of data that can be decoded and interpreted into useful information. However, without honing the appropriate skills for bypassing locked Androids and correctly interpreting the data stored on them, you will be unprepared for the rapidly evolving world of smartphone forensics.

Topics: Android Forensics Overview; Android File System Structures; Android Evidentiary Locations; Handling Locked Android Devices; Traces of User Activity on Android Devices; Malware and Spyware Forensics

585.3 HANDS ON: iOS Forensics

Apple iOS devices are no longer restricted to the United States, they are now in use worldwide. iOS devices contain substantial amounts of data, including deleted records, that can be decoded and interpreted into useful information. Proper handling and parsing skills are needed for bypassing locked iOS devices and correctly interpreting the data. Without iOS instruction, you will be unprepared to deal with the iOS device that will likely be a major component in a forensics investigation.

Topics: iOS Forensics Overview and Acquisition; Handling Locked iOS Devices; iOS File System Structures; iOS Evidentiary Locations; Traces of User Activity on iOS Devices

585.4 HANDS ON: Backup File and BlackBerry Forensics

BlackBerry smartphones are designed to protect user privacy, but techniques taught in this section will enable the investigator to go beyond what the tools decode and manually recover data residing in database files of BlackBerry device file systems. Backup file systems are commonly found on external media and can be the only forensics acquisition method for newer iOS devices that are locked. Learning how to access and parse data from encrypted backup files may be the only lead to smartphone data relating to your investigation.

Topics: Backup File Forensics Overview; Creating and Parsing Backup Files; Evidentiary Locations on Backup Files; Locked Backup Files; Blackberry Forensics Overview; Blackberry Forensic Acquisition and Best Practices; Blackberry File System and Evidentiary Locations; Blackberry Forensic Analysis

585.5 HANDS ON: Third-Party Application and Other Smartphone Device Forensics

Given the prevalence of other types of smartphones around the world, it is critical for examiners to develop a foundation of understanding about data storage on multiple devices. Nokia smartphones running the Symbian operating system may no longer be manufactured, but they still exist in the wild. You must acquire skills for handling and parsing data from uncommon smartphone devices. This day of instruction will prepare you to deal with "misfit" smartphone devices and provide you with advanced methods for decoding data stored in third-party applications across all smartphones.

Topics: Third-Party Applications on Smartphones Overview; Third-Party Application Locations on Smartphones; Decoding Third-Party Application Data on Smartphones; Knock-off Phone Forensics; Nokia (Symbian) Forensics; Windows Phone/Mobile Forensics

585.6 HANDS ON: Smartphone Forensics Capstone Exercise

This section will test all that you have learned during the course. Working in small groups, students will examine three smartphone devices and solve a scenario relating to a real-world smartphone forensics investigation. Each group will independently analyze the three smartphones, manually decode data, answer specific questions, form an investigation hypothesis, develop a report and present findings.

You Will Be Able To

- Extract and use information from smartphones and mobile devices, including Android, iOS, Blackberry, Windows Phone, Symbian, and Chinese knock-off devices
- Understand how to detect hidden malware and spyware on smartphones and extract information related to security breaches, cyber espionage, and advanced threats involving smartphones
- Prevent loss or destruction of valuable data on smartphones by learning proper handling of these devices
- Learn a variety of acquisition methods for smartphones with an understanding of the advantages and limitations of each acquisition approach
- Interpret file systems on smartphones and locate information that is not generally accessible to users
- Recover artifacts of user activities from third-party applications on smartphones
- Recover location-based and GPS information from smartphones
- Perform advanced forensic examinations of data structures on smartphones by diving deeper into underlying data structures that many tools do not interpret
- Analyze SQLite databases and raw data dumps from smartphones to recover deleted information
- Perform advanced data-carving techniques on smartphones to validate results and extract missing or deleted data
- Reconstruct events surrounding a crime using information from smartphones, including timeline development and link analysis (who communicated with whom, locations at particular times)
- Decrypt locked backup file and bypass smartphone locks
- Apply the knowledge you acquire during the course to conduct a full-day smartphone capstone event involving multiple devices and modeled after real-world smartphone investigations

FOR610

Reverse-Engineering Malware: Malware Analysis Tools and Techniques

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Lenny Zeltser

giac.org

sans.edu

BUNDLE ONDEMAND
WITH THIS COURSE
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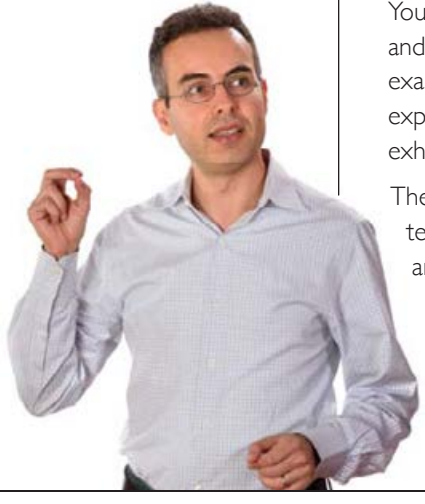
DFIR
digital-forensics.sans.org



This popular malware analysis course helps forensic investigators, incident responders, security engineers and IT administrators acquire practical skills for examining malicious programs that target and infect Windows systems. Understanding the capabilities of malware is critical to an organization's ability to derive the threat intelligence it needs to respond to information security incidents and fortify defenses. The course builds a strong foundation for analyzing malicious software using a variety of system and network monitoring utilities, a disassembler, a debugger and other tools useful for turning malware inside-out.

Who Should Attend

- Individuals who have dealt with incidents involving malware and want to learn how to understand key aspects of malicious programs
- Technologists who have informally experimented with aspects of malware analysis prior to the course and are looking to formalize and expand their expertise in this area
- Forensic investigators and IT practitioners looking to expand their skillsets and learn how to play a pivotal role in the incident response process

The course begins by covering fundamental aspects of malware analysis. You will learn how to set up an inexpensive and flexible laboratory to understand the inner workings of malicious software and uncover characteristics of real-world malware samples. Then you will learn to examine the specimens' behavioral patterns and code. The course continues by discussing essential x86 assembly language concepts. You will examine malicious code to understand its key components and execution flow. Additionally, you will learn to identify common malware characteristics by looking at suspicious Windows API patterns employed by bots, rootkits, keyloggers, downloaders, and other types of malware.

"The training is very well documented with lots of hands-on labs, in addition, all topics are discussed thoroughly and reinforced." -Chaz Hobson, Deutsche Bank

This course will teach you how to handle self-defending malware. You'll learn how to bypass the protection offered by packers, and other anti-analysis methods. In addition, given the frequent use of browser malware for targeting systems, you will learn practical approaches to analyzing malicious browser scripts and deobfuscating JavaScript and VBScript to understand the nature of the attack.

You will also learn how to analyze malicious documents that take the form of Microsoft Office and Adobe PDF files. Such documents act as a common infection vector and may need to be examined when dealing with large-scale infections as well as targeted attacks. The course also explores memory forensics approaches to examining malicious software, especially useful if it exhibits rootkit characteristics.

The course culminates with a series of Capture-the-Flag challenges designed to reinforce the techniques learned in class and provide additional opportunities to learn practical malware analysis skills in a fun setting.

Hands-on workshop exercises are a critical aspect of this course and allow you to apply malware analysis techniques by examining malware in a lab that you control. When performing the exercises, you will study the supplied specimens' behavioral patterns and examine key portions of their code. To support these activities, you will receive pre-built Windows and Linux virtual machines that include tools for examining and interacting with malware.

Lenny Zeltser *SANS Senior Instructor*

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 member of the Board of Directors 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. @lennyzeltser

610.1 HANDS ON: Malware Analysis Fundamentals

Section one lays the groundwork for malware analysis by presenting the key tools and techniques useful for examining malicious programs. You will learn how to save time by exploring Windows malware in two phases. Behavioral analysis focuses on the program'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 debugger tools such as IDA Pro and OllyDbg. You will learn how to set up a flexible laboratory to perform such analysis in a controlled manner, and set up such a lab on your laptop using the supplied Windows and Linux (REMnux) virtual machines. You will then learn how to use the key analysis tools by examining a malware sample in your lab – with guidance and explanations from the instructor – to reinforce the concepts discussed throughout the day.

Topics: Assembling a Toolkit for Effective Malware Analysis; Examining Static Properties of Suspicious Programs; Performing Behavioral Analysis of Malicious Windows Executables; Performing Static and Dynamic Code Analysis of Malicious Windows Executables; Contributing Insights to the Organization's Larger Incident Response Effort

610.2 HANDS ON: Malicious Code Analysis

Section two focuses on examining malicious Windows 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 section begins with an overview of key code-reversing concepts and presents a primer on essential x86 Intel 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 remaining part of the section discusses how malware implements common characteristics, such as keylogging and DLL injection, at the assembly level. You will learn how to recognize such characteristics in suspicious Windows executable files.

Topics: Core Concepts for Analyzing Malware at the Code Level; x86 Intel Assembly Language Primer for Malware Analysts; Identifying Key x86 Assembly Logic Structures with a Disassembler; Patterns of Common Malware Characteristics at the Windows API Level (DLL Injection, Function Hooking, Keylogging, Communicating over HTTP, etc.)

610.3 HANDS ON: In-Depth Malware Analysis

Section three builds upon the approaches to behavioral and code analysis introduced earlier in the course, exploring techniques for uncovering additional aspects of the functionality of malicious programs. You will learn about packers and the techniques that may help analysts bypass their defenses. Additionally, you will understand how to redirect network traffic in the lab to better interact with malware to understand its capabilities. You will also learn how to examine malicious websites and deobfuscate browser scripts, which often play a pivotal role in malware attacks.

Topics: Recognizing Packed Malware; Automated Malware Unpacking Tools and Approaches; Manual Unpacking of Using OllyDbg, Process Dumping Tools and Imports-Rebuilding Utilities; Intercepting Network Connections in the Malware Lab; Interacting with Malicious Websites to Examine their Nature; Deobfuscating Browser Scripts Using Debuggers and Runtime Interpreters; JavaScript Analysis Complications

You Will Be Able To

- Build an isolated, controlled 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, registry, network, and other processes in a Windows environment
- Uncover and analyze malicious JavaScript and VBScript components of web pages, which are often used by exploit kits for drive-by attacks
- Control relevant aspects of the malicious program's behavior through network traffic interception and code patching to perform effective malware analysis
- Use a disassembler and a debugger to examine the inner-workings of malicious Windows executables
- Bypass a variety of packers and other 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 and anti-analysis measures
- 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 perform incident response triage
- Utilize practical memory forensics techniques to examine capabilities of rootkits and other malicious program types.

610.4 HANDS ON: Self-Defending Malware

Section four focuses on the techniques malware authors commonly employ to protect malicious software from being examined, often with the help of packers. You will learn how to recognize and bypass anti-analysis measures, such as tool detection, string obfuscation, unusual jumps, breakpoint detection and so on. We will also discuss the role that shellcode plays in the context of malware analysis and learn how to examine this aspect of attacks. As with the other topics covered throughout the course, you will be able to experiment with such techniques during hands-on exercises.

Topics: Bypassing Anti-Analysis Defenses; Recovering Concealed Malicious Code and Data; Unpacking More Sophisticated Packers to Locate the Original Entry Point (OEP); Identifying and Disabling Methods Employed by Malware to Detect Analysts' Tools; Analyzing Shellcode to Assist with the Examination of Malicious Documents and other Artifacts

610.5 HANDS ON: Malicious Documents and Memory Forensics

Section five starts by exploring common patterns of assembly instructions often used to gain initial access to the victim's computer. Next, we will learn how to analyze malicious Microsoft Office documents, covering tools such as OfficeMalScanner and exploring steps for analyzing malicious PDF documents with practical tools and techniques. 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 analyze malware more efficiently.

Topics: Analyzing Malicious Microsoft Office (Word, Excel, PowerPoint) Documents; Analyzing Malicious Adobe PDF Documents; Analyzing Memory to Assess Malware Characteristics and Reconstruct Infection Artifacts; Using Memory Forensics to Analyze Rootkit Infections

610.6 HANDS ON: Malware Analysis Tournament

Section 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 hands-on challenges involving real-world malware in the context of a fun tournament. These challenges further a student's ability to respond to typical malware-reversing tasks in an instructor-led lab environment and offer additional learning opportunities. Moreover, 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. The students who score the highest in the malware reverse-engineering challenge will be awarded the coveted SANS' Digital Forensics Lethal Forensicator coin. Game on!

Topics: Behavioral Malware Analysis; Dynamic Malware Analysis (Using a Debugger); Static Malware Analysis (Using a Disassembler); JavaScript Deobfuscation; PDF Document Analysis; Office Document Analysis; Memory Analysis

MGT414

SANS Training Program for CISSP® Certification

Course Updated for New CISSP® Exam

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 7:00pm (Day 1)
8:00am - 7:00pm (Days 2-5)
8:00am - 5:00pm (Day 6)
46 CPEs
Laptop NOT Needed
Instructor: Jonathan Ham

giac.org

MEETS DoDD 8570 REQUIREMENTS

sans.org/8570

BUNDLE ONDEMAND
WITH THIS COURSE
sans.org/ondemand

SANS MGT414: SANS Training Program for CISSP® Certification is an accelerated review course that has been specifically updated to prepare you to pass the 2015 version of the CISSP® exam.

Course authors Eric Conrad and Seth Misenar have revised MGT414 to take into account the 2015 updates to the CISSP® exam and prepare students to navigate all types of questions included in the new version.

"I think the course material and the instructor are very relevant for the task of getting a CISSP. The overall academic exercise is solid."
-Aaron Lewter, Availity

Who Should Attend

- Security professionals who are interested in understanding the concepts covered on 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® 8 domains
- Security professionals and managers looking for practical ways the 8 domains of knowledge can be applied to their current job

MGT414 focuses solely on the 8 domains of knowledge as determined by (ISC)² that form a critical part of the CISSP® exam. Each domain of knowledge is dissected into its critical components, and those components are then discussed in terms of their relationship with one another and with other areas of information security.

"This is a great way to refresh and review my knowledge before sitting for the CISSP exam. This course not only focused on the material at hand, but portrayed it with real-life examples that made it easy to relate to! One of the best classes and experiences I have had."
-Glenn C., Leidos

Obtaining Your CISSP® Certification Consists of:

- Fulfilling minimum requirements for professional work experience
- Completing the Candidate Agreement
- Review of your 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

Take advantage of SANS' CISSP® Get Certified Program currently being offered.
sans.org/special/cissp-get-certified-program

Jonathan Ham *SANS Certified Instructor*

Jonathan is an independent consultant who specializes in large-scale enterprise security issues from policy and procedure to staffing and training, scalable prevention, detection, and response technology and techniques. With a keen understanding of ROI and TCO (and an emphasis on process over products), he has helped his clients achieve greater success for over 12 years, advising everything from small start-ups to Fortune 500 companies and public sector entities. He's been commissioned to teach NCIS investigators how to use Snort, performed packet analysis from a facility more than 2000 feet underground, and chartered and trained the CIRT for one of the largest U.S. civilian federal agencies. He has variously held the CISSP, GSEC, GCIA, and GCIH certifications, and is a member of the GIAC Advisory Board. A former combat medic, Jonathan still spends some of his time practicing a different kind of emergency response, volunteering and teaching for both the National Ski Patrol and the American Red Cross. @@jhamcorp

414.1 Introduction; Security and Risk Management

On the first day of training for the CISSP® exam, MGT414 introduces the specific requirements needed to obtain certification. The 2015 exam update will be discussed in detail. We will cover the general security principles needed to understand the 8 domains of knowledge, with specific examples for each domain. The first of the 8 domains, Security and Risk Management, is discussed using real-world scenarios to illustrate the critical points.

Topics: Overview of CISSP® Certification; Introductory Material; Overview of the 8 Domains; Domain 1: Security and Risk Management

414.2 Asset Security and Security Engineering (PART 1)

Understanding asset security is critical to building a solid information security program. The Asset Security domain, the initial focus of today's course section, describes data classification programs, including those used by both governments/militaries and the private sector. We will also discuss ownership, covering owners ranging from business/mission owners to data and system owners. We will examine data retention and destruction in detail, including secure methods for purging data from electronic media. We then turn to the first part of the Security Engineering domain, including new topics for the 2015 exam such as the Internet of Things, Trusted Platform Modules, Cloud Security, and much more.

Topics: Domain 2: Asset Security; Domain 3: Security Engineering (Part 1)

You Will Be Able To

- Understand the 8 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.
- Understand and explain all of the concepts covered in the 8 domains of knowledge.
- Apply the skills learned across the 8 domains to solve security problems when you return to work.

414.3 Security Engineering (PART 2); Communication and Network Security

This section continues the discussion of the Security Engineering domain, including a deep dive into cryptography. The focus is on real-world implementation of core cryptographic concepts, including the three types of cryptography: symmetric, asymmetric, and hashing. Salts are discussed, as well as rainbow tables. We will round out Domain 3 with a look at physical security before turning to Domain 4, Communication and Network Security. The discussion will cover a range of protocols and technologies, from the Open Systems Interconnection (OSI) model to storage area networks.

Topics: Domain 3: Security Engineering (Part 2); Domain 4: Communication and Network Security

414.4 Identity and Access Management

Controlling access to data and systems is one of the primary objectives of information security. Domain 5, Identity and Access Management, strikes at the heart of access control by focusing on identification, authentication, and authorization of accounts. Password-based authentication represents a continued weakness, so Domain 5 stresses multi-factor authentication, biometrics, and secure credential management. The 2015 CISSP® exam underscores the increased role of external users and service providers, and mastery of Domain 5 requires an understanding of federated identity, SSO, SAML, and third-party identity and authorization services like Oauth and OpenID.

Topics: Domain 5: Identity and Access Management

414.5 Security Assessment and Testing; Security Operations

This course section covers Domain 6 (Security Assessment) and Domain 7 (Security Operations). Security Assessment covers types of security tests, testing strategies, and security processes. Security Operations covers investigatory issues, including eDiscovery, logging and monitoring, and provisioning. We will discuss cutting-edge technologies such as cloud, and we'll wrap up day five with a deep dive into disaster recovery.

Topics: Domain 6: Security Assessment; Domain 7: Security Operations

414.6 Software Development Security

Domain 8 (Software Development Security) describes the requirements for secure software. Security should be "baked in" as part of network design from day one, since it is always less effective when it is added later to a poor design. We will discuss classic development models, including waterfall and spiral methodologies. We will then turn to more modern models, including agile software development methodologies. New content for the 2015 CISSP® exam update will be discussed, including DevOps. We will wrap up this course section by discussing security vulnerabilities, secure coding strategies, and testing methodologies.

Topics: Domain 8: Software Development Security

MGT512

SANS Security Leadership Essentials for Managers with Knowledge Compression™

SANS

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 6:00pm (Days 1-4)
9:00am - 4:00pm (Day 5)
33 CPEs
Laptop NOT Needed
Instructor: G. Mark Hardy

GSLC
giac.org

SANS Technology Institute
sans.edu

MEETS DoDD 8570 REQUIREMENTS
sans.org/8570

BUNDLE ONDEMAND
WITH THIS COURSE
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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.

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 their technical people are telling them

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.

Knowledge Compression™

Maximize your learning potential!

Knowledge Compression™ is an optional add-on feature to a SANS class that 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!

G. Mark Hardy *SANS Certified Instructor*

G. Mark Hardy is founder and President of the National Security Corporation. He has been providing cybersecurity 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. He 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 wartime Director, Joint Operations Center for U.S. 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, BA in Mathematics, Masters in Business Administration, and a Masters in Strategic Studies, and holds the GSLC, CISSP, CISM, and CISA certifications. @g_mark

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, and the Procurement Process

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

You will learn about 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 also learn the methods of the 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

This course section examines 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

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.

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 how 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

Security Leaders and Managers earn the highest salaries (well into 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.

"MGT512 has great info for newly assigned managers to cybersecurity."
-Kerry T., U.S. Army Corps of Engineers

"MGT512 is one of the most valuable courses I've taken with SANS. It really did help bridge the gap from security practitioner to security orchestrator. Truly a gift!"
-John Madick, Epiq Systems, Inc.

MGT514

IT Security Strategic Planning, Policy, and Leadership

SANS

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 5:00pm
30 CPEs
Laptop NOT Needed
Instructor: Frank Kim

SANS Technology Institute
sans.edu

BUNDLE ONDEMAND
WITH THIS COURSE
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"I loved the enthusiasm and life experience that was brought into class."
-SANS SCOTTSDALE 2015 STUDENT

As security professionals we have seen the landscape change. Cybersecurity is now more vital and relevant to the growth of your organization than ever before. As a result, information security teams have more visibility, more budget, and more opportunity. However, with this increased responsibility comes more scrutiny.

This course teaches security professionals how to do three things:

Who Should Attend

- CISOs
- Information security officers
- Security directors
- Security managers
- Aspiring security leaders
- Other security personnel who have team lead or management responsibilities

Develop Strategic Plans

Strategic planning is hard for people in IT and IT security because we spend so much time responding and reacting. 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. Learn how to develop strategic plans that resonate with other IT and business leaders.

Create Effective Information Security Policy

Policy is a manager's opportunity to express expectations for the workforce, 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 to successfully guide your organization.

Develop Management and Leadership Skills

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. 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. Learn to utilize management tools and frameworks to better lead, inspire, and motivate your teams.

How the Course Works

Using case studies from Harvard Business School, team-based exercises, and discussions that put students in real-world scenarios, students will participate in activities that they can then carry out with their own team members when they return to work.

The next generation of security leadership must bridge the gap between security staff and senior leadership by strategically planning how to build and run effective security programs. After taking this course you will have the fundamental skills to create strategic plans that protect your company, enable key innovations, and work effectively with your business partners.

Frank Kim *SANS Certified Instructor*

As CISO at the SANS Institute, Frank leads the security risk function for the most trusted source of computer security training, certification, and research in the world. He also helps shape, develop, and support the next generation of security leaders by teaching, developing courseware, and leading the management and software security curricula. Prior to the SANS Institute, Frank was Executive Director of Cyber Security at Kaiser Permanente with accountability for delivering innovative security solutions to meet the unique needs of the nation's largest not-for-profit health plan and integrated health care provider with annual revenue of $55 billion, 9.5 million members, and 175,000 employees. In recognition of his work, Frank was a two-time recipient of the CIO Achievement Award for business enabling thought leadership. Frank holds degrees from the University of California at Berkeley and is the author of popular SANS courseware on strategic planning, leadership, and application security. @sansappsec

514.1 Strategic Planning Foundations

Creating security strategic plans requires a fundamental understanding of the business and a deep understanding of the threat landscape.

Topics: Vision & Mission Statements; Stakeholder Management; PEST Analysis; Porter's Five Forces; Threat Actors; Asset Analysis; Threat Analysis

514.2 Strategic Roadmap Development

With a firm understanding of business drivers as well as the threats facing the organization, you will develop a plan to analyze the current situation, identify the target situation, perform gap analysis, and develop a prioritized roadmap. In other words, you will be able to determine 1) what you do today, 2) what you should be doing in the future, 3) what you don't do, and 4) what you should do first. With this plan in place you will learn how to build and execute your plan by developing a business case, defining metrics for success, and effectively marketing your security program.

Topics: Historical Analysis; Values and Culture; SWOT Analysis; Vision and Innovation; Security Framework; Gap Analysis; Roadmap Development; Business Case Development; Metrics and Dashboards; Marketing and Executive Communications

514.3 Security Policy Development and Assessment

Policy is one of the key tools that security leaders have to influence and guide the organization. Security managers must understand how to review, write, assess, and support security policy and procedure. Using an instructional delivery methodology that balances lecture, exercises, and in-class discussion, this course section will teach techniques to create successful policy that users will read and follow and business leaders will accept. Learn key elements of policy, including 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.

Topics: Purpose of Policy; Policy Gap Analysis; Policy Development; Policy Review; Awareness and Training

514.4 Leadership and Management Competencies

Learn the critical skills you need to lead, motivate, and inspire your teams to achieve the goal. By establishing a minimum standard for the knowledge, skills, and abilities required to develop leadership you will understand how to motivate employees and develop from a manager into a leader.

Topics: Leadership Building Blocks; Creating and Developing Teams; Coaching and Mentoring; Customer Service Focus; Conflict Resolution; Effective Communication; Leading Through Change; Relationship Building; Motivation and Self-Direction; Teamwork; Leadership Development

514.5 Strategic Planning Workshop

Using the case study method, students will work through real-world scenarios by applying the skills and knowledge learned throughout the course. Case studies are taken directly from Harvard Business School, the pioneer of the case-study method, and focus specifically on information security management and leadership competencies. The Strategic Planning Workshop serves as a capstone exercise for the course, allowing students to synthesize and apply concepts, management tools, and methodologies learned in class.

Topics: Creating a Security Plan for the CEO; Understanding Business Priorities; Enabling Business Innovation; Working with BYOD; Effective Communication; Stakeholder Management

You Will Be Able To

- Develop security strategic plans
- Understand business and organization drivers
- Develop a stakeholder management strategy
- Conduct Porter's, PEST, and SWOT analysis
- Understand threat actors and their motivations
- Market and communicate your strategic plans
- Understand approaches for creating a security business case
- Develop and assess security policy
- Manage the policy creation process
- Understand the use of leadership competencies
- Motivate and inspire your teams
- Analyze case studies from leading universities

"The instructor not only provided relevant content, he delivered it in an engaging way."

-Brian Cook, SANS 2015 student

"As I progress in my career within cybersecurity, I find that courses such as MGT514 will allow me to plan and lead organizations forward."

-Eric Burgan, Idaho National Labs

"Really good case studies and examples which prompted useful class discussion."

-Alexis Brownings, CERT-UK

MGT525

IT Project Management, Effective Communication, and PMP® Exam Prep

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop NOT Needed
Instructor: Jeff Frisk

giac.org

sans.edu

Project Management Institute
Registered Education Provider

Recently updated to fully prepare you for the 2015 PMP® Exam, **SANS 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. 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* (Fifth Edition) is provided to all participants. You can reference the guide and use your course material along with the knowledge you gain in class to prepare for the 2015 updated PMP® Exam and the GIAC Certified Project Manager Exam.

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

"Best way to prepare top project managers for the real world and certification!"

-Rob Ashworth, Barling Bay

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.

"Honestly, this is one of the best courses I have had to date. I feel like I have thousands of things to take back to my job." -Ryan Spencer, Reed Elsevier Inc.

Jeff Frisk *SANS Certified Instructor*

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 the 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.

525.1 Project Management Structure and 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 your project is well defined from the outset. 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 Baselining; 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

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 that 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, and assign triggers and risk response responsibilities
- Create project earned value baselines and project schedule and cost forecasts

525.5 Quality and Risk Management

On day five you will become familiar with quality planning, assurance, and 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 how to understand and use 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, Stakeholder Management, and Project Integration

We close out the week with the procurement aspects of project and stakeholder management, and then integrate all of the concepts presented into a solid, broad-reaching approach. We cover different types of contracts and then the make-versus-buy decision process. We go over ways to initiate strong requests for quotations (RFQ) and develop evaluation criteria, then qualify and select the best partners for your project. Stakeholder communication and management strategies are reinforced. The final session integrates everything we have learned by bringing all the topics together with the common process groups. Using a 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; Stakeholder Communication and Stakeholder Management Strategies; Project Execution; Monitoring Your Project's Progress; Finalizing Deliverables; Forecasting and Integrated Change Control

AUD507

Auditing & Monitoring Networks, Perimeters, and Systems

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: David Hoelzer

giac.org

sans.edu

MEETS DoDD 8570 REQUIREMENTS

sans.org/8570

BUNDLE ONDEMAND
WITH THIS COURSE
sans.org/ondemand

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 auditors 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

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 specifically organized 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 are taken from real-world examples.

One of the struggles that IT auditors face today is helping management understand the relationship between the technical controls and the risks to the business that these controls address. 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 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. Students are 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 gain the mix of theoretical, hands-on, and practical knowledge to conduct a great audit.

David Hoelzer *SANS Faculty Fellow*

David Hoelzer is the author of more than 20 sections of SANS courseware. He is an expert in a variety of information security fields, having served in most major roles in the IT and security industries over the past 25 years. Recently, David was called upon to serve as an expert witness for the Federal Trade Commission for ground-breaking GLBA Privacy Rule litigation. David has been highly involved in governance at the SANS Technology Institute, serving as a member of the Curriculum Committee as well as Audit Curriculum Lead. As a SANS instructor, David has trained security professionals from agencies such as the NSA and DHHS, Fortune 500 companies, various Department of Defense sites, national laboratories, and many colleges and universities. David is a research fellow for the Center for Cybermedia Research and for the Identity Theft and Financial Fraud Research Operations Center (ITFF/ROC). He also is an adjunct research associate for the UNLV Cybermedia Research Lab and a research fellow with the Internet Forensics Lab. David has written and contributed to more than 15 peer-reviewed books, publications, and journal articles. Currently, he serves as the principal examiner and director of research for Enclave Forensics, a New York/Las Vegas-based incident response and forensics company. He also serves as the chief information security officer for Cyber-Defense, an open-source security software solution provider. In the past, David served as the director of the GIAC Certification program, bringing the GIAC Security Expert certification to life. He holds a BS in IT, Summa Cum Laude, having spent time either attending or consulting for Stony Brook University, Binghamton University, and American Intercontinental University. @david_hoelzer

507.1 Effective Auditing, Risk Assessment, and Reporting

After laying the foundation for the role and function of an auditor in the information security field, this day's material will give you two extremely useful risk assessment methods that are particularly effective for measuring the security of enterprise systems, identifying control gaps and risks, and gaining the knowledge to be able to recommend additional compensating controls to address the risk. Nearly a third of the day is spent covering important audit considerations and questions dealing with virtualization and cloud computing.

Topics: Auditor's Role in Relation to Policy Creation, Policy Conformance, and Incident Handling; Basic Auditing and Assessment Strategies; Risk Assessment; The Six-Step Audit Process; Virtualization and Cloud Computing

507.2 Effective Network and Perimeter Auditing/Monitoring

On this day we will build from the ground up dealing with security controls, proper deployment, and effective auditing and continuous monitoring of configuration from Layer 2 all the way up the stack. Students will learn how to identify insecurely configured VLANs, determine perimeter firewall requirements, examine enterprise routers, and much more.

Topics: Secure Layer 2 Configurations; Router and Switch Configuration Security; Firewall Auditing, Validation, and Monitoring; Wireless; Network Population Monitoring; Vulnerability Scanning

507.3 Web Application Auditing

Web applications have consistently been rated for the past several years as one of the top five vulnerabilities that enterprises face. Unlike the other top vulnerabilities, however, enterprises continue to accept this risk, since most modern corporations need an effective web presence to do business today. One of the most important lessons that we are learning as an industry is that installing an application firewall is not enough!

Topics: Identifying Controls Against Information Gathering Attacks; Processing Controls to Prevent Hidden Information Disclosures; Control Validation of the User Sign-on Process; Examining Controls Against User Name Harvesting; Validating Protections Against Password Harvesting; Best Practices for OS and Web Server Configuration; How to Verify Session Tracking and Management Controls; Identification of Controls to Handle Unexpected User Input; Server-side Techniques for Protecting Your Customers and Their Sensitive Data

507.4 Advanced Windows Auditing and Monitoring

Microsoft's business-class system makes up a large part of the typical IT infrastructure. Quite often, these systems are also the most difficult to effectively secure and control because of the enormous number of controls and settings within the operating system. This course day will provide you with the techniques and tools to build an effective long-term audit program for your Microsoft Windows environment. More importantly, during the course a continuous monitoring and reporting system is built out, allowing you to easily and effectively scale the testing discussed within your enterprise when you return home.

Topics: Progressive Construction of a Comprehensive Audit Program; Automating the Audit Process; Windows Security Tips and Tricks; Maintaining a Secure Enterprise

507.5 Advanced Unix Auditing and Monitoring

Students will gain a deeper understanding of the inner workings and fundamentals of the Unix operating system as applied to the major Unix environments in use in business today. Students will have the opportunity to explore, assess and audit Unix systems hands-on. Lectures describe the different audit controls that are available on standard Unix systems, as well as access controls and security models.

Topics: Auditing to Create a Secure Configuration; Auditing to Maintain a Secure Configuration; Auditing to Determine What Went Wrong

507.6 Audit the Flag: A NetWars Experience

This final day of the course presents a capstone experience with additional learning opportunities. Leveraging the well-known NetWars engine, students have the opportunity to connect to a simulated enterprise network environment. Building on the tools and techniques learned throughout the week, each student is challenged to answer a series of questions about the enterprise network, working through various technologies explored during the course.

Topics: Network Devices; Servers; Applications; Workstations

You Will Be Able To

- Understand the different types of controls (e.g., technical vs. non-technical) essential to perform a successful audit
- Conduct a proper risk assessment of a network to identify vulnerabilities and prioritize what will be audited
- Establish a well-secured baseline for computers and networks, constituting a standard against which one can conduct audits
- 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 applications 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

"AUD507 provided me additional insight to the technical side of security auditing. Great course and a super instructor!"
-Carlos E., U.S. Army

"AUD507 not only prepares you to perform a comprehensive audit but also provides excellent information to operations for an improved network security posture."
-Rifat I., State Dept FCU

DEV522 Defending Web Applications Security Essentials

SANS

Six-Day Program
Mon, Mar 14 - Sat, Mar 19
9:00am - 5:00pm
36 CPEs
Laptop Required
Instructor: Johannes Ullrich, PhD

giac.org

sans.edu

BUNDLE ONDEMAND
WITH THIS COURSE
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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 course to take if you have to defend web applications!

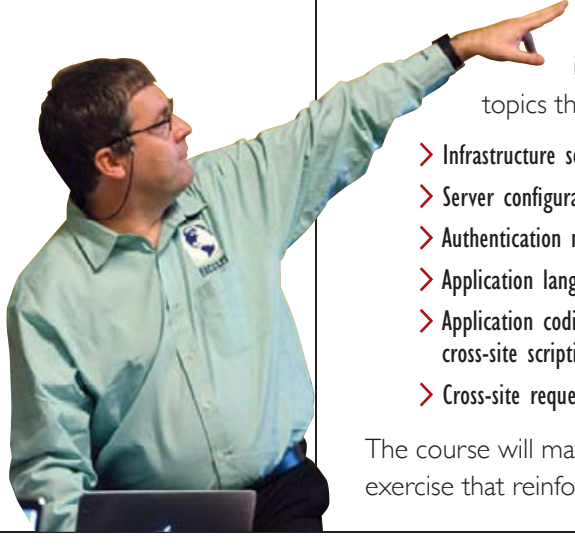
The quantity and importance of data entrusted to web applications is growing, and defenders need to learn how to secure them. Traditional network defenses, such as firewalls, fail to secure web applications. DEV522 covers the OWASP Top 10 Risks and will help you better understand web application vulnerabilities, 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 applications that have been proven to work. The testing aspect of vulnerabilities will also be covered so that 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.

"The current security landscape is rapidly changing and the course content is relevant and important to software security and compliance software." -Scott Hoof, Tripwire, Inc.

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, auditors who are interested in recommending proper mitigations for web security issues, and infrastructure security professionals who have an interest in better defending their web applications.



The course will also cover additional issues the authors have found to be important in their day-to-day web application development practices. 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 and conclude with a large defensive exercise that reinforces the lessons learned throughout the week.

Johannes Ullrich, PhD *SANS Senior Instructor*

As Dean of Research for the SANS Technology Institute, Johannes is currently responsible for the SANS Internet Storm Center (ISC) and the GIAC Gold program. In 2000, he founded DShield.org, which is now the data collection engine behind the ISC. His work with the ISC has been widely recognized, and in 2004, Network World named him one of the 50 most powerful people in the networking industry. Prior to working for SANS, Johannes worked as a lead support engineer for a web development company and as a research physicist. Johannes holds a PhD in Physics from SUNY Albany and is based in Jacksonville, Florida. His daily podcast summarizes current security news in a concise format. @johullrich

522.1 Web Basics and Authentication Security

We begin day one with an overview of recent web application attack and security trends, then follow up by examining the essential technologies that are at play in web applications. You cannot win the battle if you do not understand what you are trying to defend. We arm you with the right information so you can understand how web applications work and the security concepts related to them.

Topics: HTTP Basics; Overview of Web Technologies; Web Application Architecture; Recent Attack Trends; Authentication Vulnerabilities and Defense; Authorization Vulnerabilities and Defense

522.2 Web Application Common Vulnerabilities and Mitigations

Since the Internet does not guarantee the secrecy of information being transferred, encryption is commonly used to protect the integrity and secrecy of information on the web. This course day covers the security of data in transit or on disk and how encryption can help with securing that information in the context of web application security.

Topics: SSL Vulnerabilities and Testing; Proper Encryption Use in Web Application; Session Vulnerabilities and Testing; Cross-site Request Forgery; Business Logic Flaws; Concurrency; Input-related Flaws and Related Defenses; SQL Injection Vulnerabilities, Testing, and Defense

522.3 Proactive Defense and Operation Security

Day three begins with a detailed discussion on cross-site scripting and related mitigation and testing strategies, as well as HTTP response splitting. The code in an application may be totally locked down, but if the server setting is insecure, the server running the application can be easily compromised. Locking down the web environment is essential, so we cover this basic concept of defending the platform and host. To enable any detection of intrusion, logging and error handling must be done correctly. We will discuss the correct approach to handling incidents and logs, then dive even further to cover the intrusion detection aspect of web application security. In the afternoon we turn our focus to the proactive defense mechanism so that we are ahead of the bad guys in the game of hack and defend.

Topics: Cross-site Scripting Vulnerability and Defenses; Web Environment Configuration Security; Intrusion Detection in Web Applications; Incident Handling; Honeytoken

You Will Be Able To

- Understand the major risks and common vulnerabilities related to web applications through real-world examples
- Mitigate common security vulnerabilities in web applications using proper coding techniques, software components, configurations, and defensive architecture
- Understand the best practices in various domains of web application security such as authentication, access control, and input validation
- Fulfill the training requirement as stated in PCI DSS 6.5
- Deploy and consume web services (SOAP and REST) in a more secure fashion
- Proactively deploy cutting-edge defensive mechanisms such as the defensive HTTP response headers and Content Security Policy to improve the security of web applications
- Strategically roll out a web application security program in a large environment
- Incorporate advanced web technologies such as HTML5 and AJAX cross-domain requests into applications in a safe and secure manner
- Develop strategies to assess the security posture of multiple web applications

522.4 AJAX and Web Services Security

Day four is dedicated to the security of asynchronous JavaScript and XML (AJAX) and web services, which are currently the most active areas in web application development. Security issues continue to arise as organizations dive head first into insecurely implementing new web technologies without first understanding them. We will cover security issues, mitigation strategies, and general best practices for implementing AJAX and web services. We will also examine real-world attacks and trends to give you a better understanding of exactly what you are protecting against. Discussion focuses on the web services in the morning and AJAX technologies in the afternoon.

Topics: Web Services Overview; Security in Parsing of XML; XML Security; AJAX Technologies Overview; AJAX Attack Trends and Common Attacks; AJAX Defense

522.5 Cutting-Edge Web Security

Day five focuses on cutting-edge web application technologies and current research areas. Topics such as clickjacking and DNS rebinding are covered. These vulnerabilities are difficult to defend and multiple defense strategies are needed for their defense to be successful. Another topic of discussion is the new generation of single-sign-on solutions such as OpenID. We cover the implications of using these authentication systems and the common "gotchas" to avoid. With the Web2.0 adoption, the use of Java applet, Flash, ActiveX, and Silverlight are on the increase. The security strategies of defending these technologies are discussed so that these client-side technologies can be locked down properly.

Topics: Clickjacking; DNS Rebinding; Flash Security; Java Applet Security; Single-Sign-On Solution and Security; IPv6 Impact on Web Security

522.6 Capture and Defend the Flag Exercise

Day six starts with an introduction to the secure software development life cycle and how to apply it to web development. But the focus is a large lab that will tie together the lessons learned during the week and reinforce them with hands-on applications. Students will be provided with a virtual machine to implement a complete database-driven dynamic website. In addition, they will use a custom tool to enumerate security vulnerabilities and simulate a vulnerability assessment of the website. Students will then have to decide which vulnerabilities are real and which are false positives, and then mitigate the vulnerabilities. The scanner will score the student as vulnerabilities are eliminated or checked off as false positives. Advanced students will be able to extend this exercise and find vulnerabilities not presented by the scanner. Students will learn through these hands-on exercises how to secure the web application, starting with the operating system, the web server, finding configuration problems in the application language setup, and finding and fixing coding problems in the site.

Topics: Mitigation of Server Configuration Errors; Discovering and Mitigating Coding Problems; Testing Business Logic Issues and Fixing Problems; Web Services Testing and Security Problem Mitigation

DEV541

Secure Coding in Java/JEE: Developing Defensible Applications

SANS

Four-Day Program
Sat, Mar 12 - Tue, Mar 15
9:00am - 5:00pm
24 CPEs
Laptop Required
Instructors:
Eric Johnson & Steve Kosten

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Bundle OnDemand
with this course
sans.org/ondemand

"DEV541 will help change the way the developers in my organization code. We have not placed a high amount of emphasis on secure coding before."
-Brett Hanson, Agrium

This secure coding course will teach students how to build secure Java applications and gain the knowledge and skills to keep a website from getting hacked, counter a wide range of application attacks, prevent critical security vulnerabilities that can lead to data loss, and understand the mindset of attackers.

The course teaches you the art of modern web defense for Java applications by focusing on foundational defensive techniques, cutting-edge protection, and Java EE security features you can use in your applications as soon as you return to work. This includes learning how to:

- Identify security defects in your code
- Fix security bugs using secure coding techniques
- Utilize secure HTTP headers to prevent attacks
- Secure your sensitive representational state transfer (REST) services
- Incorporate security into your development process
- Use freely available security tools to test your applications

Who Should Attend

- Developers who want to build more secure applications
- Java Enterprise Edition (JEE) programmers
- Software engineers
- Software architects
- Developers who need to be trained in secure coding techniques to meet PCI compliance
- 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

Great developers have traditionally distinguished themselves by the elegance, effectiveness and reliability of their code. That is still true, but the security of the code now needs to be added to those other qualities. This unique SANS course allows you to hone the skills and knowledge required to prevent your applications from getting hacked.

"This course provided a great review in Java development practices to ensure secure and defensible applications." -John Davis, Lockheed Martin Corporation

DEV541: Secure Coding in Java/JEE: Developing Defensible Applications is a comprehensive course covering a wide set of skills and knowledge. It is not a high-level theory course – it is about real-world, hands-on programming. You will examine actual code, work with real tools, build applications and gain confidence in the resources you need to improve the security of Java applications.

Rather than teaching students to use a given set of tools, the course covers 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 OWASP Top 10 and CWE/SANS Top 25 Most Dangerous Programming Errors.

The course culminates in a Secure Development Challenge in which students 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 implement fixes for these issues using the secure coding techniques that you have learned in the course.

PCI Compliance

Section 6.5 of the Payment Card Industry (PCI) Data Security Standard (DSS) instructs auditors to verify processes that require training in secure coding techniques for developers. If you are responsible for developing applications that process cardholder data and are therefore required to be PCI compliant, then this is the course for you.

Steve Kosten *SANS Instructor*

Steve Kosten is a security consultant at Cypress Data Defense. He previously performed security work in the defense and financial sectors and headed up the security department for a financial services firm. He is currently the Open Web Application Security Project (OWASP) Denver chapter leader and is on the board for the OWASP AppSec USA conference. He has presented security talks before numerous conferences. He is experienced in secure code review, vulnerability assessment, penetration testing, and risk management. He holds a Bachelor of Science degree in Aerospace Engineering from Pennsylvania State University and a Master of Science in Information Security from James Madison University. He currently maintains GSSP-JAVA, GWAPT, CISSP, and CISM certifications. Steve resides in Golden, Colorado. In his spare time, Steve enjoys attending his childrens' sporting events with his wife, road and mountain biking, snowboarding, golfing, volleyball, and paragliding.

DEV544

Secure Coding in .NET: Developing Defensible Applications

SANS

Four-Day Program
Wed, Mar 16 - Sat, Mar 19
9:00am - 5:00pm
24 CPEs
Laptop Required
Instructor: Eric Johnson

giac.org

sans.edu

Bundle OnDemand
WITH THIS COURSE
sans.org/ondemand

ASP.NET and the .NET framework have provided web developers with tools that allow them an unprecedented degree of flexibility and productivity. However, 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 responsibility is still on application developers to understand the limitations of the framework and ensure that their own code is secure.

Have you ever wondered if the built-in ASP.NET validation is effective? Have you been concerned that Windows Communication Foundation (WCF) 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?

Who Should Attend

- ASP.NET developers who want to build more secure web applications
- .NET framework developers
- Software engineers
- Software architects
- Developers who need to be trained in secure coding techniques to meet PCI compliance
- Application security auditors
- Technical project managers
- Senior software QA specialists
- Penetration testers

"This is a must-have for all applications and must-know for all developers. I recommend it to my colleagues." -Praveen Paleti, Western Union Business Solutions

DEV544: Secure Coding in .NET: Developing Defensible Applications will help students leverage built-in and custom defensive technologies to integrate security into their applications. This comprehensive course covers a huge set of skills and knowledge. It is not a high-level theory course. It is about real programming. Students examine actual code, work with real tools, build applications, and gain confidence in the resources they need to improve the security of .NET applications.

Rather than teaching students to use a set of tools, the course teaches 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 OWASP Top 10 and CWE/SANS Top 25 Most Dangerous Programming Errors.

"It is shocking to see how much we are missing in our code. I am going back to change the code immediately." -Ruojie Wang, New Jersey Hospital Association

The class culminates with a security review of a real-world open-source application. Students will conduct a code review, review a penetration test report, perform security testing to actually exploit real vulnerabilities, and finally, using the secure coding techniques that they have learned in class, implement fixes for these issues.

PCI Compliance

Section 6.5 of the Payment Card Industry (PCI) Data Security Standard (DSS) instructs auditors to verify processes that require training in secure coding techniques for developers. This is the course for you if your application processes cardholder data and you are required to meet PCI compliance.

Eric Johnson *SANS Certified Instructor*

Eric Johnson is a Senior Security Consultant at Cypress Data Defense and the Application Security Curriculum Product Manager at SANS. He is the lead author and instructor for DEV544 Secure Coding in .NET, as well as an instructor for DEV541 Secure Coding in Java/JEE. Eric serves on the advisory board for the SANS Securing the Human Developer Awareness Training Program and is a contributing author for the developer security awareness modules. His experience includes web and mobile application penetration testing, secure code review, risk assessment, static source code analysis, security research, and developing security tools. Eric completed a Bachelor of Science degree in computer engineering and a master of science in information assurance at Iowa State University, and currently holds the CISSP, GWAPT, GSSP-.NET, and GSSP-Java certifications. He is based in West Des Moines, IA and outside the office enjoys spending time with his wife and daughter, attending Iowa State athletic events, and golfing on the weekends. @emjohn20

ICS410

ICS/SCADA Security Essentials

SANS

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 5:00pm
30 CPE/CMU Credits
Laptop Required
Instructor: Justin Searle

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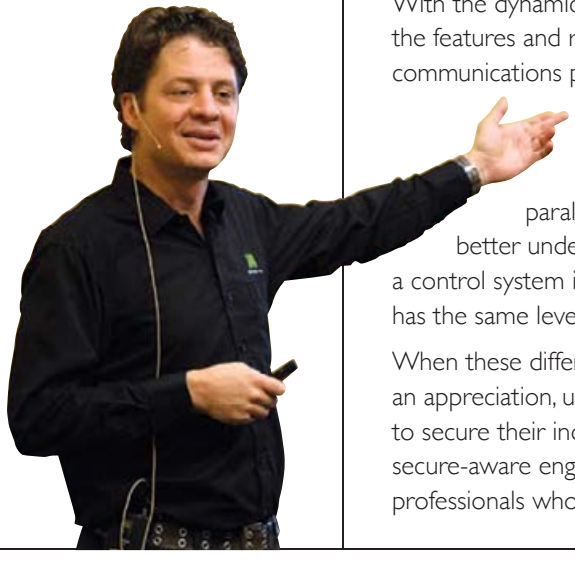

SANS has joined forces with industry leaders to equip security professionals and control system engineers with the cybersecurity skills they need to defend national critical infrastructure. **ICS410: ICS/SCADA Security Essentials** provides a foundational set of standardized skills and knowledge for industrial cybersecurity professionals. The course is designed to ensure that the workforce involved in supporting and defending industrial control systems is trained to keep the operational environment safe, secure, and resilient against current and emerging cyber threats.

Who Should Attend

The course is designed for the range of individuals who work in, interact with, or can affect industrial control system environments, including asset owners, vendors, integrators, and other third parties. These personnel primarily come from four domains:

- IT (includes operational technology support)
- IT security (includes operational technology security)
- Engineering
- Corporate, industry, and professional standards

The course will provide you with:

- An understanding of industrial control system components, purposes, deployments, significant drivers, and constraints
- Hands-on lab learning experiences to control system attack surfaces, methods, and tools
- Control system approaches to system and network defense architectures and techniques
- Incident-response skills in a control system environment
- Governance models and resources for industrial cybersecurity professionals

When examining the greatest risks and needs in critical infrastructure sectors, the course authors looked carefully at the core security principles necessary for the range of tasks involved in supporting control systems on a daily basis. While other courses are available for higher-level security practitioners who need to develop specific skills such as industrial control system penetration testing, vulnerability analysis, malware analysis, forensics, secure coding, and red team training, most of these courses do not focus on the people who operate, manage, design, implement, monitor, and integrate critical infrastructure production control systems.

With the dynamic nature of industrial control systems, many engineers do not fully understand the features and risks of many devices. In addition, IT support personnel who provide the communications paths and network defenses do not always grasp the systems' operational drivers and constraints. This course is designed to help traditional IT personnel fully understand the design principles underlying control systems and how to support those systems in a manner that ensures availability and integrity. In parallel, the course addresses the need for control system engineers and operators to better understand the important role they play in cybersecurity. This starts by ensuring that a control system is designed and engineered with cybersecurity built into it, and that cybersecurity has the same level of focus as system reliability throughout the system lifecycle.

When these different groups of professionals complete this course, they will have developed an appreciation, understanding, and common language that will enable them to work together to secure their industrial control system environments. The course will help develop cyber-secure-aware engineering practices and real-time control system IT/OT support carried out by professionals who understand the physical effects of actions in the cyber world.

Justin Searle *SANS Certified Instructor*

Justin Searle is a Managing Partner of UtiliSec, specializing in Smart Grid security architecture design and penetration testing. Justin led the Smart Grid Security Architecture group in the creation of NIST Interagency Report 7628 and played key roles in the Advanced Security Acceleration Project for the Smart Grid (ASAP-SG). He currently leads the testing group at the National Electric Sector Cybersecurity Organization Resources (NESCOR). Justin has taught courses in hacking techniques, forensics, networking, and intrusion detection for multiple universities, corporations, and security conferences. In addition to electric power industry conferences, Justin frequently presents at top international security conferences such as Black Hat, DEFCON, OWASP, Nullcon, and AusCERT. Justin co-leads prominent open-source projects including the Samurai Web Testing Framework (SamuraiWTF), the Samurai Security Testing Framework for Utilities (SamuraiSTFU), Middler, Yokoso!, and Laudanum. He has an MBA in International Technology and is a CISSP and SANS GIAC certified Incident Handler (GCIH), Intrusion Analyst (GCIA), and Web Application Penetration Tester (GWAPT). @meeas

410.1 ICS Overview

Students will develop and reinforce a common language and understanding of Industrial Control System (ICS) cybersecurity as well as the important considerations that come with cyber-to-physical operations within these environments. Each student will receive programmable logic controller (PLC) hardware to keep. The PLC contains physical inputs and outputs that will be programmed in class and mapped to an operator interface, or HMI, also created in class. This improved hardware-enabled approach provides the necessary cyber-to-physical knowledge that allows students to better understand important ICS operational drivers and constraints that require specific safety protection, communications needs, system management approaches, and cybersecurity implementations. Essential terms, architectures, methodologies, and devices are all covered to build a common language for students from a variety of different roles.

Topics: Global Industrial Cybersecurity Professional (GICSP) Overview; Overview of ICS; Field Components; Programming Controllers; Supervisory Components; Types of ICS Systems; IT & ICS Differences; Physical Security; ICS Network Architecture

410.2 ICS Attack Surface

If you know the adversary's approaches to attacking an ICS environment, you will be better prepared to defend that environment. Numerous attack vectors exist within an ICS environment. Some are similar to traditional IT systems, while others are more specific to ICS. During Day 2, defenders will develop a better understanding of where these specific attack vectors exist, as well as the tools to use to discover vulnerabilities and exploit them. Each student will use a vulnerable target virtual machine to further understand attacks targeting the types of web servers used on many ICS devices for management purposes. Simulators will be configured to allow students to conduct attacks against unauthenticated ICS protocols. A variety of data samples are used to examine additional attack vectors on remote devices.

Topics: ICS Attack Surface; Attacks on HMIs and UIs; Attacks on Control Servers; Attacks on Network Communications; Attacks on Remote Devices

410.3 Defending ICS Servers and Workstations

Students will learn essential ICS-related server and workstation operating system capabilities, implementation approaches, and system management practices. Students will receive and work with both Windows- and Linux-based virtual machines in order to understand how to monitor and harden these hosts from attack. Students will examine concepts that benefit ICS systems such as system hardening, log management, monitoring, alerting, and audit approaches, then look at some of the more common applications and databases used in ICS environments across multiple industries.

Topics: Windows in ICS; Linux/Unix in ICS; Updates and Patching; Processes and Services; Configuration Hardening; Endpoint Defenses; Automation and Auditing; Log Management; Databases and Historians

410.4 Defending ICS Networks and Devices

With an understanding of the ICS environment, the attack vectors that exist, and the defender-specific capabilities available on servers, workstations, and applications, students will now learn network-specific defense approaches. We'll first examine common IT protocols and network components used within ICS environments, then discuss ICS-specific protocols and devices. Technologies used to defend ICS networks will be reviewed along with implementation approaches. Students will interact with ICS traffic and develop skills to analyze it, then work through a number of tools to further explore a series of staged adversary actions conducted in a lab environment.

Topics: Network Fundamentals; Ethernet; TCP/IP Protocol Suite; ICS Protocols over TCP/IP; Enforcement Zone Devices; Honeypots; Wireless in Control Systems; Network Capture Forensics; Field and Plant Floor Equipment; Cryptography Fundamentals

410.5 ICS Security Governance

Students will learn about the various models, methodologies, and industry-specific regulations that are used to govern what must be done to protect critical ICS systems. Key business processes that consider risk assessments, disaster recovery, business impact analysis, and contingency planning will be examined from the perspective of ICS environments. On this final course day, students will work together on an incident response exercise that places them squarely in an ICS environment that is under attack. This exercise ties together key aspects of what has been learned throughout the course and presents students with a scenario to review with their peers. Specific incident-response roles and responsibilities are considered, and actions available to defenders throughout the incident response cycle are explored. Students will leave with a variety of resources for multiple industries and will be well prepared to pursue the GICSP, an important ICS-focused professional certification.

Topics: Information Assurance Foundations; Security Policies; Contingency and Continuity Planning; Risk Assessment and Auditing; Attack Tree Analysis; Password Management; Incident Handling; Incident Response;

You Will Be Able To

- Run Windows command line tools to analyze the system looking for high-risk items
- Run Linux command line tools (ps, ls, netstat, ect) 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
- Better understand various industrial control systems and their purpose, application, function, and dependencies on network IP and industrial communications
- Work with operating systems (system administration concepts for Unix/Linux and/or Windows operating systems)
- Work with network infrastructure design (network architecture concepts, including topology, protocols, and components)
- Better understand the systems' security lifecycle
- Better understand information assurance principles and tenets (confidentiality, integrity, availability, authentication, non-repudiation)
- Use your skills in computer network defense (detecting host and network-based intrusions via intrusion detection technologies)
- Implement incident response and handling methodologies

"Great introduction into ICS landscape and associated security concerns. The ICS material presented will provide immediate value relative to helping secure my company."

-Mike Poulos, Coca-Cola Enterprises

LEG523

Law of Data Security and Investigations

SANS

Five-Day Program
Mon, Mar 14 - Fri, Mar 18
9:00am - 5:00pm
30 CPE/CMU Credits
Laptop NOT Needed
Instructor: Benjamin Wright

giac.org

SANS Technology Institute
sans.edu

BUNDLE ONDEMAND
WITH THIS COURSE
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Who Should Attend

- Investigators
- Security and IT professionals
- Lawyers
- Paralegals
- Auditors
- Accountants
- Technology managers
- Vendors
- Compliance officers
- Law enforcement
- Privacy officers
- Penetration testers

- **Cyber insurer's lawsuit against hospital to deny coverage after data breach and $4.1 million legal settlement with patients.**
- **Sony Pictures' alleged denial of service attack on sites dumping its corporate data stolen by North Korea.**
- **Target's and Home Depot's legal and public statements about payment card breaches.**
- **New legal tips on confiscating and interrogating mobile devices.**
- **Lawsuit by credit card issuers against Target's QSA and alleged security vendor, Trustwave.**

New law on privacy, e-discovery and data security is creating an urgent need for professionals who can bridge the gap between the legal department and the IT department. SANS LEG523 provides this unique professional training, including skills in the analysis and use of contracts, policies and records management procedures.

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

Each successive day of this five-day course builds upon lessons from the earlier days in order to comprehensively strengthen your ability to help your enterprise (public or private sector) cope with illegal hackers, botnets, malware, phishing, unruly vendors, data leakage, industrial spies, rogue or uncooperative employees, or bad publicity connected with IT security. We will cover recent stories ranging from Home Depot's legal and public statements about a payment card breach to the lawsuit by credit card issuers against Target's QSA and security vendor, Trustwave.

"I have gained many valuable ideas and tools to support and defend my organization and to strengthen security overall. I wish I'd taken LEG523 3-4 years ago."
-Tom S., Case Western Reserve University

Recent updates to the course address hot topics such as legal tips on confiscating and interrogating mobile devices, the retention of business records connected with cloud computing and social networks like Facebook and Twitter, and analysis and response to the risks and opportunities surrounding open-source intelligence gathering.

Over the years this course has adopted an increasingly global perspective. Non-U.S. professionals attend LEG523 because there is no training like it anywhere else in the world. For example, a lawyer from the national tax authority in an African country took the course because electronic filings, evidence and investigations have become so important to her work. International students help the instructor, U.S. attorney Benjamin Wright, constantly revise the course and include more content that crosses borders.

Benjamin Wright *SANS Senior Instructor*

Benjamin Wright is the author of several technology law books, including *Business Law and Computer Security*, published by the SANS Institute. With 26 years in private law practice, he has advised many organizations, large and small, on privacy, e-commerce, computer security, and e-mail discovery and has been quoted in publications around the globe, from the Wall Street Journal to the Sydney Morning Herald. Mr. Wright is known for spotting and evaluating trends, such as the rise of whistleblowers wielding small video cameras. In 2010, Russian banking authorities tapped him for experience and advice on the law of cyber investigations and electronic payments. @benjaminwright

523.1 Fundamentals of IT Security Law and Policy

The first day is an introduction to law and IT that serves as the foundation for discussions during the rest of the course. We survey the general legal issues that must be addressed in establishing best information security practices, then canvass the many new laws on data security and evaluate information security as a field of growing legal liability. We will cover computer crime and intellectual property laws when a network is compromised, as well as emerging topics such as honeypots and active defenses, i.e., enterprises hacking back against illegal hackers. We will look at the impact of future technologies on law and investigations in order to help students factor in legal concerns when they draft enterprise IT security policies. For example, students will debate what the words of an enterprise policy would mean in a courtroom. The course also dives deep into the legal question of what constitutes a "breach of data security" for purposes of notifying others about it or for other purposes. The course includes a case study on the drafting of policy to comply with the Payment Card Industry Data Security Standard (PCI).

523.2 E-Records, E-Discovery and Business Law

IT professionals can advance their careers by upgrading their expertise in the hot fields of e-discovery and cyber investigations. Critical facets of those fields come forward in course day two. We will focus on the use of computer records in disputes and litigation, with a view to teaching students how to manage requests to turn over e-records to adversaries (i.e., e-discovery), how to manage implementation of a "legal hold" over some records to prevent their destruction, and how to coordinate with legal counsel to develop workable strategies to legal challenges. Transactions that used to be conducted on paper are now done electronically, so commercial law now applies to computer security. The IT function within an enterprise has become the custodian of an enterprise's business records. You will learn how to craft sound policy for the retention and destruction of electronic records like email, text messages, and social networking interactions. We will provide methods for balancing the competing interests in electronic records management, including costs, risks, security, regulations and user cooperation.

523.3 Contracting for Data Security and Other Technology

Day three focuses on the essentials of contract law sensitive to the current legislative requirements for security. Compliance with many of the new data security laws requires contracts. Because IT pulls together the products and services of many vendors, consultants, and outsourcers, enterprises need appropriate contracts to comply with Sarbanes-Oxley, Gramm-Leach-Bliley, HIPAA, EU Data Directive, data breach notice laws and other regulations. The course provides practical steps and tools that students can apply to their enterprises and includes a lab on writing contract-related documents relevant to the students' professional responsibilities. You will learn the language of common IT contract clauses and the issues surrounding those clauses, and become familiar with specific legal cases that show how different disputes have been resolved in litigation.

You Will Be Able To

- Work better with other professionals at your organization who make decisions about the law of data security and investigations.
- Exercise better judgment on how to comply with technology regulations, both in the United States and in other countries.
- Evaluate the role and meaning of contracts for technology, including services, software and outsourcing.
- Help your organization better explain its conduct to the public and to legal authorities.
- Anticipate technology law risks before they get out of control.
- Implement practical steps to cope with technology law risk.
- Better explain to executives what your organization should do to comply with information security and privacy law.
- Better evaluate technologies, such as digital signatures, to comply with the law and serve as evidence.
- Make better use of electronic contracting techniques to get the best terms and conditions.
- Exercise critical thinking to understand the practical implications of technology laws and industry standards (such as the Payment Card Industry Data Security Standard).

523.4 The Law of IT Compliance: How to Conduct Investigations

Information security professionals and cyber investigators operate in a world of ambiguity, rapid change, and legal uncertainty. To address these challenges, this course day presents methods to analyze a situation and then act in a way that is ethical and defensible and reduces risk. Lessons will be invaluable to the effective and credible execution of any kind of investigation, be it internal, government, consultant, security incident, or any other. The lessons also include methods and justifications for maintaining the confidentiality of an investigation. The course surveys white-collar fraud and other misbehavior with an emphasis on the role of technology in the commission and prevention of that fraud. It teaches IT managers practical and case-study-driven lessons about the monitoring of employees and employee privacy. As IT security professionals take on more responsibility for controls throughout an enterprise, it is natural that they worry about fraud, which becomes a new part of their domain. This day covers what fraud is, where it occurs, what the law says about it and how it, can be avoided and remedied. Indeed, the primary objective of Sarbanes-Oxley is not to keep hackers out; it is to snuff out fraud inside the enterprise.

523.5 Applying Law to Emerging Dangers: Cyber Defense

Knowing some rules of law is not the same as knowing how to deal strategically with real-world legal problems. This day is organized around extended case studies in security law: break-ins, investigations, piracy, extortion, rootkits, phishing, botnets, espionage and defamation. The studies lay out the chronology of events and critique what the good guys did right and what they did wrong. The goal is to learn to apply principles and skills to address incidents in your day-to-day work. The course includes an in-depth review of legal responses to the major security breaches at TJX, Target, and Home Depot, and looks at how to develop a Bring Your Own Device (BYOD) policy for an enterprise and its employees. The skills learned are a form of crisis management, with a focus on how your enterprise will be judged in a courtroom, by a regulatory agency, or in a contract relationship. Emphasis will be on how to present your side of a story to others, such as law enforcement, Internet gatekeepers, or the public at large, so that a security incident does not turn into a legal fiasco. In addition to case studies, the core material will include tutorials on relevant legislation and judicial decisions in such areas as privacy, negligence, contracts, e-investigations, computer crime and offensive countermeasures. LEG523 is increasingly global in its coverage, so although this course day centers around U.S. law, non-U.S. law and the roles of government authorities outside the United States will be examined, as well.

SANS Hosted is a series of courses presented by other educational providers at SANS 2016 to complement your needs for training outside of our current course offerings.

HOSTED

Health Care Security Essentials

NEW!

Two-Day Course | Sat, Mar 12 - Sun, Mar 13 | 9:00am - 5:00pm | 12 CPEs | Laptop Required | Instructor: Greg Porter

Health Care Security Essentials is designed to provide SANS students with an introduction to current and emerging issues in health care information security and regulatory compliance. The class provides a foundational set of skills and knowledge for health care security professionals by integrating case studies, hands-on labs, and tips for securing and monitoring electronic Protected Health Information. Administrative insights for those managing the many aspects of health care security operations will also be discussed. The goal of the course is to present a substantive overview and analysis of relevant information security subject matter that is having a direct and material impact on the U.S. health care system.

MODULE 1: **Overview of Health Care Information Security**

The theft of sensitive health care information continues to challenge covered entities and business associates alike. Increased regulation combined with a dynamic threat landscape requires today's health care information security professionals to not only understand the intent of relevant legislation but also how to best assist a business with meeting regulatory demands while monitoring and sustaining the protection of patient data and customer information.

The first module of the class focuses on current threats to health care information systems and data. We will examine the "how" and "why" patient information is being targeted as well as key trends, including, but not limited to, the commercialization of malicious software , medical identity theft, insider threats, mobile device proliferation, cloud computing, and poor operational governance. The module will conclude with a discussion on common sources of health care data breaches and practical countermeasures.

MODULE 2: **HIPAA Security 2.0**

The HIPAA Security Rule has presented its share of challenges for health care organizations over the past several years, yet relatively lax enforcement has led many covered entities to delay their commitment to a sustainable compliance program. However, the final omnibus rule has made notable changes to HIPAA compliance obligations while also broadening the law's enforcement provisions.

Module 2 will provide attendees with an overview of the HIPAA Security Rule and its context, with close attention paid to the rules structure, safeguards, and the implementation specifications governing electronic Protected Health Information. Students will also examine breach notification requirements and conclude the module by reviewing the security implications of Electronic Medical Records and Meaningful Use.

HOSTED

Physical Penetration Testing

Two-Day Course | Sun, Mar 20 - Mon, Mar 21 | 9:00am - 5:00pm | 12 CPEs | Laptop NOT Needed | Instructor: The CORE Group

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 controls 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.

SEC440

Critical Security Controls: Planning, Implementing, and Auditing

Two-Day Course | Sun, Mar 20 - Mon, Mar 21 | 9:00am - 5:00pm | 12 CPEs | Laptop NOT Needed | Instructor: Randy Marchany

This course will help you master specific, proven techniques and tools needed to implement and audit the Critical Security Controls as documented by the Council on CyberSecurity. The controls are rapidly becoming accepted as the highest priority list of what must be done and proven before anything else at nearly all serious and sensitive organizations. The controls were selected and defined by the U.S. military and other government and private organizations (including NSA, DHS, GAO, and many others) that are the most respected experts on how attacks actually work and what can be done to stop them. These entities defined the controls as their consensus for the best way to block known attacks and find and mitigate damage from the attacks that get through. For security professionals, the course enables you to see how to put the controls in place in your existing network through effective and widespread use of 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. ***SEC440 does not contain any labs. If you are looking for hands-on labs involving the Critical Controls, you should take SEC566.***

You will find the full document describing the Critical Security Controls posted on the Council on CyberSecurity website at **http://www.cisecurity.org**

One of the best features of the course is that it uses offense to inform defense. In other words, you will learn about the actual attacks that you'll be stopping or mitigating. That makes the defenses very real, and it makes you a better security professional. As a student of the Critical Security Controls two-day course, you'll learn important skills that you can take back to your workplace and use your first day back on the job in implementing and auditing each of the controls.

SEC524

Cloud Security Fundamentals

Two-Day Course | Sun, Mar 20 - Mon, Mar 21 | 9:00am - 5:00pm | 12 CPEs | Laptop Required | Instructor: Paul A. Henry

SEC524 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 an in-depth discussion of the risks involved. This cloud security training course will go in-depth on architecture and infrastructure fundamentals for private, public and hybrid clouds, including a wide range of topics such as patch and configuration management, virtualization security, application security and change management. Policy, risk assessment, and governance within cloud environments will also be covered, with recommendations for both internal policies and contract provisions. This path leads to a discussion of compliance and legal concerns. The first day will wrap up with disaster recovery and business continuity planning using cloud models and architecture

Day 2 of this course will start with the challenges of identity and access management in cloud environments. Next, more businesses are utilizing the cloud to store critical data, so we will cover how to protect your critical data in the cloud. New approaches for data encryption, network encryption, key management and data lifecycle concerns will be covered in detail, followed by a deep dive into risk assessments and risk management. Intrusion detection and incident response in cloud environments will also be covered, along with how best to manage these critical security processes and the technologies that support them given that most controls are managed by the CSP.

SECURITY SKILL-BASED COURSES

SEC580

Metasploit Kung Fu for Enterprise Pen Testing

Two-Day Course | Sun, Mar 20 - Mon, Mar 21 | 9:00am - 5:00pm | 12 CPEs | Laptop Required | Instructor: Eric Conrad

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.

MANAGEMENT SKILL-BASED COURSES

MGT305

Technical Communication and Presentation Skills for Security Professionals

One-Day Course | Sun, Mar 13 | 9:00am - 5:00pm | 6 CPEs | Laptop Required | Instructor: David Hoelzer

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, and how to create outstanding presentation materials. 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 exercise.

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 serves 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 5,000 people and speak? 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.

MGT415

A Practical Introduction to Cyber Security Risk Management

NEW!

Two-Day Course | Sat, Mar 12 - Sun, Mar 13 | 9:00am - 5:00pm | 12 CPEs | Laptop Required | Instructor: James Tarala

In this course students will learn the practical skills necessary to perform regular risk assessments for their organizations. The ability to perform a risk assessment is crucial for organizations hoping to defend their systems. There are simply too many threats, too many potential vulnerabilities, and not enough resources to create an impregnable security infrastructure. Therefore every organization, whether it does so in an organized manner or not, will make priority decisions on how best to defend its valuable data assets. Risk assessment should be the foundational tool used to facilitate thoughtful and purposeful defense strategies.

MGT433

Securing The Human: How to Build, Maintain and Measure a High-Impact Awareness Program

Two-Day Course | Sat, Mar 12 - Sun, Mar 13 | 9:00am - 5:00pm | 12 CPEs | Laptop NOT Needed | Instructor: Lance Spitzner

Organizations have invested a tremendous amount of money and resources into securing technology, but little if anything into securing their employees and staff. As a result, people, not technology, have become their weakest link in cybersecurity. The most effective way to secure the human element is to establish a high-impact security awareness program that goes beyond just compliance and changes behaviors. This intense two-day course will teach you the key concepts and skills needed to build, maintain and measure just such a program. All course content is based on lessons learned from hundreds of security awareness programs from around the world. You will learn not only from your instructor, but from extensive interaction with your peers, as well. Please bring example materials from your security awareness program that you can show and share with other students during the course. Finally, through a series of labs and exercises, you will develop your own custom security awareness plan that you can implement as soon as you return to your organization.

MGT535

Incident Response Team Management

Two-Day Course | Sat, Mar 12 - Sun, Mar 13 | 9:00am - 5:00pm | 12 CPEs | Laptop Required | Instructor: Christopher Crowley

This course discusses the often-neglected topic of managing an incident response team. Given the frequency and complexity of today's cyber attacks, incident response is a critical function for organizations. Incident response is the last line of defense.

Detecting and efficiently responding to incidents requires strong management processes, and 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. On the other hand, incident responders with strong technical skills do not necessarily become effective incident response managers. Special training is necessary.

This course was originally developed by Dr. Eugene Schultz, the founder of the first U.S. government incident response team and an information security professional with over 26 years of experience. The course has been updated to address current issues such as the advanced persistent threat, incident response in the cloud, and threat intelligence.

BONUS SESSIONS

SANS@Night Evening Talks

Enrich your SANS training experience! Evening talks by our instructors and selected subject-matter experts help you broaden your knowledge, hear from the voices that matter in computer security, and get the most for your training dollar.

KEYNOTE: **The Current Reality: Defending a Compromised Network** *Dr. Eric Cole*

Designing and securing a network is a complex process. With detailed requirements to support all of the latest devices, mobile computing, cloud services, and the portability requirements of data, current networks are porous, difficult to secure, and compromised. Networks directly connected to the Internet are compromised and should be the new baseline for designing and building out security. The question that has to be answered is how to implement security based on the assumption that security is more than just setting up and protecting perimeters.

In this talk, Dr. Cole will share real-life examples of security solutions that work to protect current environments that might be already compromised. Attendees will learn how to present this new thought process to decision-makers and create solutions covering data protection, network design, and network monitoring. The focus of security should not be on preventing a compromise, but on controlling the amount of damage caused by one, which is done by focusing on dwell time and lateral movement.

DIY Vulnerability Discovery with DLL Side Loading *Jake Williams*

In this talk, Jake Williams – contributing author to FOR526, FOR610, and SEC760 – will teach you how to discover vulnerabilities like a rock star using DLL side loading. This technique (ab)uses the way Windows searches for DLLs to load into a program. The behavior is nearly laughable and introduces serious risks, especially when developers don't understand filesystem permissions. Attackers know this and use it for privilege escalation and stealthy persistence. Once you understand how DLL side loading works, you'll be able to find it in your next investigation. Plus you'll look like an infosec rock star when you find vulnerabilities in your organization's custom software.

Using an Open-Source Threat Model for Prioritized Defense *James Tarala*

Threat actors are not magic and there is not an unlimited, unique list of threats for every organization. Enterprises face similar threats from similar threat sources and threat actors. So why does every organization need to perform completely unique risk assessments and prioritized control decisions? This presentation will show how specific, community-driven threat models can be used to prioritize an organization's defenses – without all the confusion. James Tarala will present a new, open, community-driven threat model that can be used by any industry to evaluate the risk it faces. Then he will show how to practically use this model to prioritize enterprise defense and map to existing compliance requirements facing organizations today. Whether you are in the Department of Defense or work for a small mom-and-pop retailer, you will be able to use this model to specifically determine a prioritized defense for your organization.

Data Theft in the 21st Century *Mike Poor*

This state-of-the-industry presentation will look into theft and exposure of huge data sets of PII and PEI (personally embarrassing and exposing information).

Making Deception a Thing for Things *Dr. Johannes Ullrich*

Many modern attacks target devices, also known as the "Internet of Things." In past honeypot deployments, we noted that the attacks emulated these devices badly, particularly for commonly attacked protocols like HTTP, telnet, and ssh. In response, we are developing an "Agile Honeypot" that allows us to respond quickly to new attacks and adjust even minor protocol details using simple configuration files. This new software tool allows us not only to emulate different devices, but also to configure these devices using a central repository as well as collecting logs from honeypots for correlation. In this talk, you will learn about the current state of agile honeypots and their ability to detect attacks. You will find out how to deploy your own copy of the honeypot to contribute to the project.

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.

Smartphone and Network Forensics Go Together Like Peas and Carrots *Heather Mahalik and Phil Hagen*

Although smartphone and network forensics are two distinct and critical forensic disciplines, there are strong ties between them. Smartphone investigations cover myriad devices, operating systems, applications, and data storage mechanisms, but a great deal of their functionality involves a single common technology – TCP/IP communications. On the other hand, hunting an attacker's network activities within your environment often identifies endpoints including smartphones as relevant to the investigation. These need in-depth device analysis.

In this talk, Heather Mahalik, will address the smartphone side of this investigative coin as covered in SANS FOR585: Advanced Smartphone Forensics. Phil Hagen will look at things from the network side as covered in SANS FOR572: Advanced Network Forensics and Analysis. We connected several smartphone devices to a heavily instrumented wireless network, then conducted some typical smartphone-based activities on the devices. Heather will address the artifacts from the device-centric point of view, while Phil will examine the network evidence to see what can be learned about the on-device activities.

As often identified in the forensic process, a comprehensive approach is necessary to conduct a thorough investigation.

The Crazy New World of Cyber Investigations: Law, Ethics and Evidence *Ben Wright*

Increasingly, employers and enterprises are engaged in cyber investigations. The explosion of cyber evidence (email, text, meta data, social media, etc.) about every little thing that anyone does or says creates a massive need for HR departments, IT departments, internal audit departments, and other investigators to find and sift through this evidence. These cyber investigations are guided, motivated, and restricted by a blizzard of new laws and court cases. Increasingly enterprises need professionals with backgrounds in cyber forensics, cyber law, and computer privacy.

SDR Quickstart Bootcamp *David Hoelzer*

No doubt you've heard of Software Defined Radio – but what is it really? How does it work? How hard is it to do? What kinds of things can you find in the world around you? This one-hour talk will introduce you to the fundamentals of radio, SDR, GnuRadio, and other tools, giving you a taste of how quickly and easily you can start capturing interesting signals happening all around you!

The 14 Absolute Truths of Security *Keith Palmgren*

Keith Palmgren has identified 14 absolute truths of security – things that remain true regardless of circumstance, network topology, organizational type, or any other variable. Recognizing these 14 absolute truths and how they affect a security program can contribute to the success of that program. Failing to recognize these truths will spell almost certain doom. Here we will take a non-technical look at each of the 14 absolute truths in turn, examine what they mean to the security manager, what they mean to the security posture, and how understanding them will lead to a successful security program.

The Control Things Platform and Its Little Minion *Justin Searle*

SamuraiSTFU was a great start to help Electronic Utilities do penetration testing of their DCS and SCADA networks, but it just wasn't enough. SamuraiSTFU has expanded its goals to include all control systems and IoT devices, thus requiring a name change and a complete rebuild of the pentest distribution. Come check out the new Control Things Platform and its new open-source hardware companion, the Control Things Minion!

Malware Analysis for Incident Responders: Getting Started *Lenny Zeltser*

Knowing how to analyze malware has become a critical skill for incident responders and forensic investigators. A good way to get started with such efforts involves examining how malicious software behaves in a controlled laboratory environment. In this two-hour seminar, Lenny Zeltser demonstrates key aspects of this process, walking you through behavioral analysis of a malware specimen by using several free tools and even peeking into the world of code analysis.

You will see practical techniques in action and understand how malware analysis will help you triage the incident to assess key capabilities of the malicious software. You will also learn how to determine ways of identifying this malware on systems in your environment by establishing indicators of compromise (IOCs). This seminar will help you start learning how to turn malware inside out.

Card Fraud 101 *G. Mark Hardy*

Ever get a call from your bank saying your credit card was stolen, but it was still in your wallet? What's going on here? Card fraud costs $16 billion annually, and it's not getting better. Target, PF Changs, Michaels, Home Depot, who's next? Find out how these big card heists are pulled off, why chip-and-pin won't solve the fraud problem, and why new payment technologies like Apple Pay pose new risks. See if your bank even bothers to use the security protections it could – we'll have a mag stripe card reader so you can really see what's in your wallet. Certified SANS Instructor G. Mark Hardy is the CEO and founder of CardKill Inc., a start-up that helps banks preemptively kill stolen cards BEFORE they are used in fraud.

Debunking the Complex Password Myth *Keith Palmgren*

Perhaps the worst advice you can give a user is "choose a complex password." The result is the impossible-to-remember password requiring the infamous sticky note on the monitor. In addition, that password gets used at a dozen sites at home, AND the very same password gets used at work. The final result ends up being the devastating password compromise. In this one-hour talk, we will look at the technical and non-technical (human nature) issues behind passwords. Attendees will gain a more complete understanding of passwords and receive solid advice on creating more easily remembered AND significantly stronger passwords at work and at home, for their users, for themselves and even for their children.

Vendor-Sponsored Events

Vendor Expo

Wed, March 10 | 12:00pm - 1:30pm & 5:30pm - 7:30pm

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 solution providers will be on hand for a one-day vendor expo, an added bonus to registered training event attendees. Attendees can visit sponsors during the lunch time and evening Vendor Expo hours to receive stamps on the Passport-to-Prizes form. Prize drawings will occur at the Vendor Welcome Reception.

VENDOR-SPONSORED Lunch

Wed, March 10 | 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.

Lunch & Learn Presentations

Throughout SANS 2016, vendors will provide sponsored lunch presentations where attendees can interact with peers and learn about vendor solutions. Take a break and get up-to-date on security technologies!

Vendor Welcome Reception

Wed, March 10 | 5:30pm - 7:30pm

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 employing to address security threats in their organization.

SANS ONLINE TRAINING

SANS courses are available via flexible and effective online training options that don't require travel or time away from your regular routine!

Simulcast sans.org/event/sans-2016/attend-remotely

Attend a live SANS event from home!

The following courses will be Simulcast live from SANS 2016:
SEC401 • FOR408 • SEC505 • SEC511 • SEC542 • SEC560 • MGT433

OnDemand Bundles sans.org/ondemand/bundles

Bundle four months of online study with your live course for just $659 with an OnDemand Bundle. The additional study will reinforce your learning through quizzes, labs, access to subject-matter experts, and more.

OnDemand sans.org/ondemand

Train anywhere, anytime with SANS OnDemand custom e-learning platform, which provides four months of online access to your course, quizzes and labs, as well as subject-matter expert support.

vLive sans.org/vlive

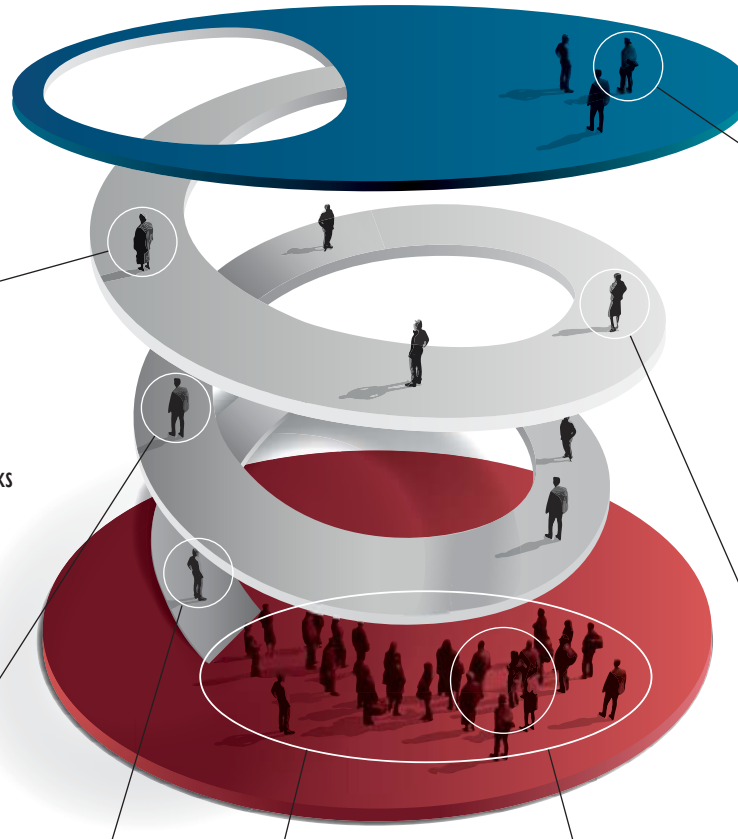
Train live and online in the evenings via SANS' vLive format, which also provides six months of online access to your course MP3s, presentations, and labs.

Registration Special Offers Available Now > sans.org/online

EDUCATING THE WORLD IN CYBERSECURITY

Protecting data has never been more important. As attackers become more sophisticated and determined, preventing a breach requires information security professionals with a honed skillset with real-world knowledge and capabilities. SANS is a one-stop education provider for information security, including security awareness programs, hands-on training, GIAC certification and graduate programs. SANS world-class instructors and proven curricula will empower you with the ability to protect and defend your vital systems and data.

The SANS family of products includes:



Cyber Guardian

Designed for the elite teams of technical security professionals whose role includes securing systems, reconnaissance, counterterrorism and counter hacks

sans.org/cyber-guardian

SANS NetWars

Testing hands-on technical skills in a safe environment so security professionals are prepared when a real incident occurs

sans.org/netwars

SANS Training

Hands-on security training for professionals just starting in security up to seasoned professionals

Training courses are delivered at live events and online

sans.org

SANS Security Awareness

Everything your organization needs for an effective security awareness program

securingthehuman.org

SANS Technology Institute

A regionally accredited postgraduate institution focused solely on information security education for working professionals

sans.edu

GIAC Certification

Validate the technical skills and knowledge of your security professionals

giac.org

SANS CyberTalent

Assess the skills and aptitude of security professionals so you can feel confident in your hiring decisions

sans.org/cybertalent

Learn more at **www.sans.org**

SANS Technology Institute

The SANS Technology Institute transforms the world's best cybersecurity training and certifications into a comprehensive, rigorous, graduate education experience.

"I was challenged by both the coursework and faculty. Earning a graduate degree from SANS had a direct and positive influence on my career."

-**Russ McRee, MSISE**
Director, Security Response & Investigations, Microsoft

POST-9/11 GI BILL

The SANS Technology Institute is approved to accept and/or certify veterans for education benefits. Programs also typically qualify for corporate tuition reimbursement plans.

GIAC — Global Information Assurance Certification — www.giac.org

Students earn industry-recognized GIAC certifications during their course of studies.

Master of Science Degrees

- Master of Science in Information Security Engineering (MSISE)
- Master of Science in Information Security Management (MSISM)

Graduate Certificates

- Cybersecurity Engineering (Core)
- Cyber Defense Operations
- Penetration Testing and Ethical Hacking
- Incident Response

To learn more,
visit **www.sans.edu**
or email
info@sans.edu

The SANS Technology Institute, an independent subsidiary of SANS, is accredited by
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U.S. Secretary of Education and the Council for Higher Education Accreditation.

FUTURE SANS TRAINING EVENTS

Information on all events can be found at sans.org/security-training/by-location/all

Cyber Defense Initiative
2015

Washington, DC
December 12-19

Philadelphia
2016

Philadelphia, PA
Feb 29 - Mar 5

Las Vegas
2016

Las Vegas, NV
January 9-14

Reston
2016

Reston, VA
April 4-9

Security East
2016

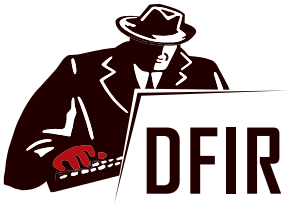
New Orleans, LA
January 25-30

Atlanta
2016

Atlanta, GA
April 4-9

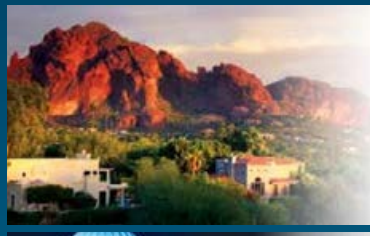
Cyber Threat Intelligence
SUMMIT & TRAINING 2016

Alexandria, VA
February 3-10



Threat Hunting & Incident Response
SUMMIT & TRAINING 2016

New Orleans, LA
April 12-19



Scottsdale
2016

Scottsdale, AZ
February 8-13

Pen Test Austin
2016

Austin, TX
April 18-23

NORTHERN VIRGINIA

McLean
2016

McLean, VA
February 15-20

Security West
2016

San Diego, CA
May 1-6

ICS Security
SUMMIT & TRAINING 2016

Orlando, FL
February 16-23

Cyber Guardian
2016

Baltimore, MD
May 9-14

Anaheim
2016

Anaheim, CA
February 22-27

Houston
2016

Houston, TX
May 9-14

FUTURE SANS TRAINING EVENTS

Information on all events can be found at sans.org/security-training/by-location/all

SANSFIRE
2016

Washington, DC
June 11-18

Portland
2016

Portland, OR
August 8-13

Salt Lake City
2016

Salt Lake City, UT
June 27 - July 2

Virginia Beach
2016

Virginia Beach, VA
August 22 - September 2

Rocky Mountain
2016

Denver, CO
July 11-16

Chicago
2016

Chicago, IL
August 22-27

Minneapolis
2016

Minneapolis, MN
July 18-23

Crystal City
2016

Crystal City, VA
September 6-11

San Antonio
2016

San Antonio, TX
July 18-23

Network Security
2016

Las Vegas, NV
September 10-17

San Jose
2016

San Jose, CA
July 25-30

Boston
2016

Boston, MA
August 1-6

Dallas
2016

Dallas, TX
August 8-13

Private Training

Live Onsite Training at Your Office Location. Both In-person and Online Options Available.

sans.org/private-training

Community SANS

Live Training in Your Local Region with Smaller Class Sizes

sans.org/community

Mentor

Live Multi-Week Training with a Mentor

sans.org/mentor

HOTEL INFORMATION

Training Campus

Walt Disney World Dolphin Resort

1500 Epcot Resorts Blvd.
Lake Buena Vista, FL 32830
sans.org/event/sans-2016/location

This resort is located in between Epcot® and Disney's Hollywood Studios™ and close to Disney's Animal Kingdom® Theme Park and Magic Kingdom® Park. Discover the magical surroundings, superior service, luxurious facilities and redesigned guest rooms featuring the Heavenly Bed®. Enjoy the new Mandara Spa, 17 spectacular restaurants and lounges, five pools, a white sand beach, two health clubs, tennis, nearby golf and many special Disney benefits.

Special Hotel Rates Available

A special discounted rate of $218.00 S/D will be honored based on space availability. Government per diem rooms are available with proper ID; you will need to call reservations and ask for the SANS government rate or use the link below to book online. These rates include high-speed Internet in your room and are only available through through 5:00pm EST on Feb 22, 2016. To make reservations, please use the following links:

For rooms at the SANS group rate:
www.swandolphin.com/groupres/SANS16

For rooms at the government rate:
www.swandolphin.com/groupres/SANSG

Weather Conditions

Temperature range in Orlando during March is 60˚-80˚. For the latest weather conditions and forecast, please consult weather.com.

Top 5 reasons to stay at the Walt Disney World Swan and Dolphin:

1. All SANS attendees receive complimentary high-speed Internet when booking in the SANS block.
2. No need to factor in daily cab fees and the time associated with travel to alternate hotels.
3. By staying at the Walt Disney World Swan and Dolphin, you gain the opportunity to further network with your industry peers and remain at the center of activities surrounding the training event.
4. SANS schedules morning and evening events at the Walt Disney World Swan and Dolphin that you won't want to miss!
5. Everything is in one convenient location!

COME TO ORLANDO!

Dear Colleagues and Friends,

What a perfect time to visit sunny Orlando at the beginning of spring while enjoying the best cybersecurity training in the industry! We will be offering more classes, bonus sessions, and vendor events than ever before, including NetWars, our cyber range challenge.

We are back at the Walt Disney World Swan and Dolphin Hotel (**www.swandolphin.com**), right next door to the Boardwalk with EPCOT and Disney's Hollywood Studios within walking distance. You can also order FastPass+ reservations before you leave home.

The Disney property is twice the size of Manhattan, so we recommend staying at the hotel complex. Benefits include complimentary transportation around Walt Disney World, an extra treat for SANS attendees, complimentary high-speed Internet, access to fitness facilities, and bottled water in the guest room. Be sure to book under the SANS special rate as these amenities are not available to the general public.

This year, SANS 2016 coincides with the EPCOT Flower and Garden Festival, which features special flower and garden displays, presentations and demonstrations, and concerts throughout the festival. Disney also has a new shopping and dining experience called Disney Springs (**www.disneysprings.com**) with brand new restaurants and experiences including a new pan-Asian and seafood restaurant. Disney's Hollywood Studios will be hosting "Seasons of the Force," which celebrates Star Wars with an interactive experience called Star Wars Launch Bay, and new versions of Star Tours celebrating Episode VII, including a special Star Wars fireworks show every weekend!

Since the class days are so intense, take advantage of the SANS hotel rate and enjoy a day or two before or after your training so you can experience everything that Orlando offers. Your family members are also invited to all of our SANS receptions. Disney has special convention tickets if you would like to go to the parks after class or to spend a full day in the parks.

For tips on the Disney parks and Orlando attractions, check out my personal favorite site at **www.allearsnet.com**, where you will find reviews, restaurant menus with prices, and park updates. You will also want to check out the SANS 2016 program guide for all of the action-packed presentations, receptions, and events as well as the social board for student gatherings. Please also feel free to e-mail me at **Brian@sans.org** if I can be of any assistance.

See you real soon at SANS 2016!

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 2016 is a way of investing in your career. To reap the maximum benefit, read the course descriptions carefully. Check out the long courses plus a wide variety of one- to three-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 the 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

We recommend you register early to ensure you get your first choice of courses.

How to Register

1. **To register, go to sans.org/event/SANS-2016/courses.**

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.**
3. **Print your invoice.**
4. **An email confirmation will arrive soon after you register.**

Use code **EarlyBird16** when registering early

Pay Early and Save

	DATE	DISCOUNT	DATE	DISCOUNT
Pay & enter code before	**1-20-16**	**$400.00**	**2-10-16**	**$200.00**

Some restrictions apply.

Group Savings (Applies to tuition only)

10% discount if 10 or more people from the same organization register at the same time

5% discount if 5-9 people from the same organization register at the same time

To obtain a group discount, complete the discount code request form at sans.org/security-training/discounts prior to registering.

Group Discounts for SANS Security Training

sans.org/vouchers

SANS Universal Voucher Credit Program

The ***SANS Universal Voucher Credit Program*** provides organizations of all sizes with a 12-month online account that is convenient and easy to manage. SANS will maximize your training investment by providing you with bonus credits. SANS Universal Voucher Credits can be used for any SANS live or online training format as well as GIAC certification exams. This will give you maximum flexibility and an easy one-time procurement process.

Get GIAC Certified!

- Only $659 when combined with SANS training
- Deadline to register at this price is the last day of SANS 2016
- Price goes to $999 after deadline
- Register today at registration@sans.org

Frequently Asked Questions

Frequently asked questions about SANS Training and GIAC Certification are posted at giac.org/overview/faq.php.

Cancellation Policy

If an attendee must cancel, a substitution request may be made at any time. Processing fees will apply. All substitution requests must be submitted by e-mail to registration@sans.org.

If an attendee must cancel without substitution, a refund can be issued for any received payments. All cancellation requests must be submitted in writing by mail or fax and postmarked by February 24, 2016. Payments will be refunded by the method that they were submitted. Processing fees will apply. No refunds will be given after the stated deadline. Accessed online materials cannot be transferred to a substitute or have payments refunded.

SANS 2016 REGISTRATION FEES

Register online at sans.org/event/sans-2016/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 before 1-20-16	Paid before 2-10-16	Paid after 2-10-16	Add GIAC Cert	Add OnDemand	Add NetWars Continuous
☐ SEC301	Intro to Information Security	$4,485	$4,685	$4,885	☐ $659	☐ $659	☐ $1,199
☐ SEC401	Security Essentials Bootcamp Style	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC501	Advanced Security Essentials – Enterprise Defender	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC503	Intrusion Detection In-Depth	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC504	Hacker Tools, Techniques, Exploits, and Incident Handling	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC505	Securing Windows with PowerShell and the Critical Security Controls	$5,110	$5,310	$5,510	☐ $659	☐ $659	☐ $1,199
☐ SEC511	Continuous Monitoring and Security Operations	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC542	Web App Penetration Testing and Ethical Hacking	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC550	Active Defense, Offensive Countermeasures and Cyber Deception **NEW!**	$4,485	$4,685	$4,885			☐ $1,199
☐ SEC560	Network Penetration Testing and Ethical Hacking **NEW!**	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC561	Immersive Hands-On Hacking Techniques	$5,220	$5,420	$5,620			☐ $1,199
☐ SEC566	Implementing and Auditing the Critical Security Controls – In-Depth	$4,485	$4,685	$4,885	☐ $659	☐ $659	☐ $1,199
☐ SEC575	Mobile Device Security and Ethical Hacking	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ SEC579	Virtualization and Private Cloud Security	$5,220	$5,420	$5,620		☐ $659	☐ $1,199
☐ SEC660	Advanced Penetration Testing, Exploit Writing, and Ethical Hacking	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ AUD507	Auditing & Monitoring Networks, Perimeters, and Systems	$5,110	$5,310	$5,510	☐ $659	☐ $659	☐ $1,199
☐ DEV522	Defending Web Applications Security Essentials	$5,110	$5,310	$5,510	☐ $659	☐ $659	☐ $1,199
☐ DEV541	Secure Coding in Java/JEE: Developing Defensible Applications	$4,020	$4,220	$4,420	☐ $659	☐ $659	☐ $1,199
☐ DEV544	Secure Coding in .NET: Developing Defensible Applications	$4,020	$4,220	$4,420	☐ $659	☐ $659	☐ $1,199
☐ FOR408	Windows Forensic Analysis	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ FOR508	Advanced Digital Forensics and Incident Response	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ FOR572	Advanced Network Forensics and Analysis	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ FOR578	Cyber Threat Intelligence **NEW!**	$4,695	$4,895	$5,095			☐ $1,199
☐ FOR585	Advanced Smartphone Forensics	$5,220	$5,420	$5,620		☐ $659	☐ $1,199
☐ FOR610	Reverse-Engineering Malware: Malware Analysis Tools and Techniques	$5,220	$5,420	$5,620	☐ $659	☐ $659	☐ $1,199
☐ ICS410	ICS/SCADA Security Essentials	$4,785	$4,985	$5,185	☐ $659	☐ $659	☐ $1,199
☐ LEG523	Law of Data Security and Investigations	$4,485	$4,685	$4,885	☐ $659	☐ $659	☐ $1,199
☐ MGT414	SANS Training Program for CISSP® Certification	$4,590	$4,790	$4,990	☐ $659	☐ $659	☐ $1,199
☐ MGT512	SANS Security Leadership Essentials for Managers with Knowledge Compression™	$4,865	$5,065	$5,265	☐ $659	☐ $659	☐ $1,199
☐ MGT514	IT Security Strategic Planning, Policy, and Leadership	$4,485	$4,685	$4,885		☐ $659	☐ $1,199
☐ MGT525	IT Project Management, Effective Communication, and PMP® Exam Prep	$4,590	$4,790	$4,990	☐ $659		☐ $1,199

Skill-Based Short Courses

		Course fee if taking a 4-6 day course	Course fee
☐ SEC440	Critical Security Controls: Planning, Implementing, and Auditing	$1,450	$2,250
☐ SEC524	Cloud Security Fundamentals	$1,350	$2,130
☐ SEC580	Metasploit Kung Fu for Enterprise Pen Testing	$1,350	$2,130
☐ MGT305	Technical Communication and Presentation Skills for Security Professionals	$850	$1,300
☐ MGT415	A Practical Introduction to Cyber Security Risk Assessment **NEW!**	$1,350	$2,130
☐ MGT433	Securing The Human: How to Build, Maintain & Measure a High-Impact Awareness Program	$1,350	$2,130
☐ MGT535	Incident Response Team Management	$1,350	$2,130
☐ HOSTED	Health Care Security Essentials **NEW!**		$2,130
☐ HOSTED	Physical Penetration Testing		$2,000
☐ SPECIAL	CORE NetWars Tournament – Tournament Entrance Fee	FREE	$1,450
☐ SPECIAL	DFIR NetWars Tournament – Tournament Entrance Fee	FREE	$1,450

Pay for any long course using the code EARLYBIRD16 at checkout by:

1-20-16 to get $400 OFF

2-10-16 to get $200 OFF

EARLYBIRD DISCOUNTS

Open a **SANS Portal Account** today to enjoy these FREE resources:

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WhatWorks Webcasts – The SANS WhatWorks webcasts bring powerful customer experiences showing how end users resolved specific IT Security issues.

Tool Talks – Tool Talks are designed to give you a solid understanding of a problem, and how a vendor's commercial tool can be used to solve or mitigate that problem.

NEWSLETTERS

NewsBites – Twice-weekly high-level executive summary of the most important news relevant to cybersecurity professionals

OUCH! – The world's leading monthly free security awareness newsletter designed for the common computer user

@RISK: The Consensus Security Alert – A reliable weekly summary of (1) newly discovered attack vectors, (2) vulnerabilities with active new exploits, (3) how recent attacks worked, and (4) other valuable data

OTHER FREE RESOURCES

- InfoSec Reading Room
- Top 25 Software Errors
- 20 Critical Controls
- Security Policies
- Intrusion Detection FAQ
- Tip of the Day
- Security Posters
- Thought Leaders
- 20 Coolest Careers
- Security Glossary
- SCORE (Security Consensus Operational Readiness Evaluation)

sans.org/account

SAVE $400 on SANS 2016 courses!

Register and pay by Jan 20th (SAVE $400) or Feb 10th (SAVE $200) – sans.org/sans-2016