IS415
System Forensics Investigation and Response
[Onsite]

Course Description:

This course offers an introduction to system forensics investigation and response. Areas of study include a procedure for investigating computer and cyber crime and concepts for collecting, analyzing, recovering and preserving forensic evidence.

Prerequisite(s) and/or Corequisite(s):

Prerequisites: IS317 Hacker Techniques, Tools and Incident Handling or equivalent, IS421 Legal and Security Issues or equivalent

Credit hours: 4

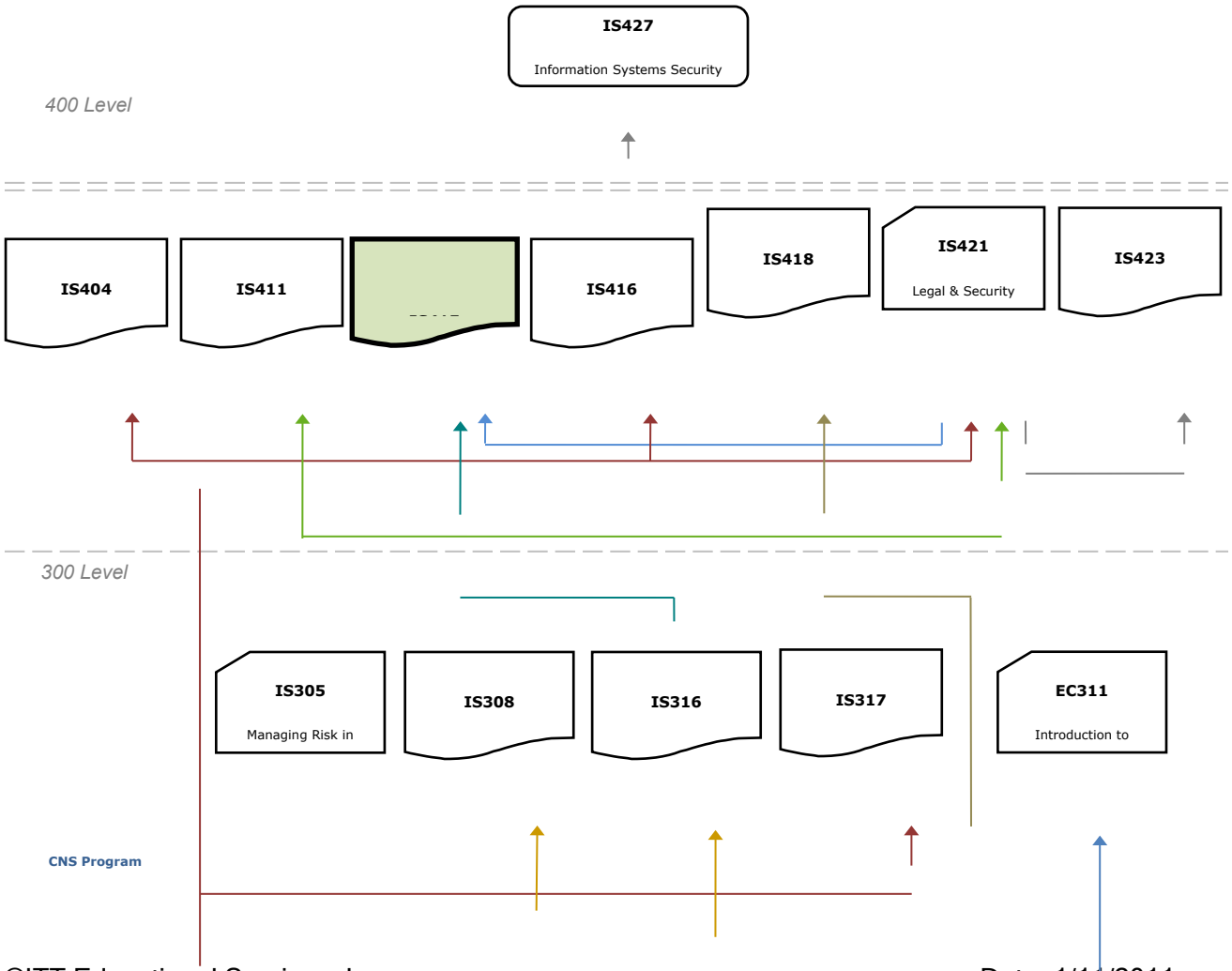
Contact hours: 50 (30 Theory Hours, 20 Lab Hours)

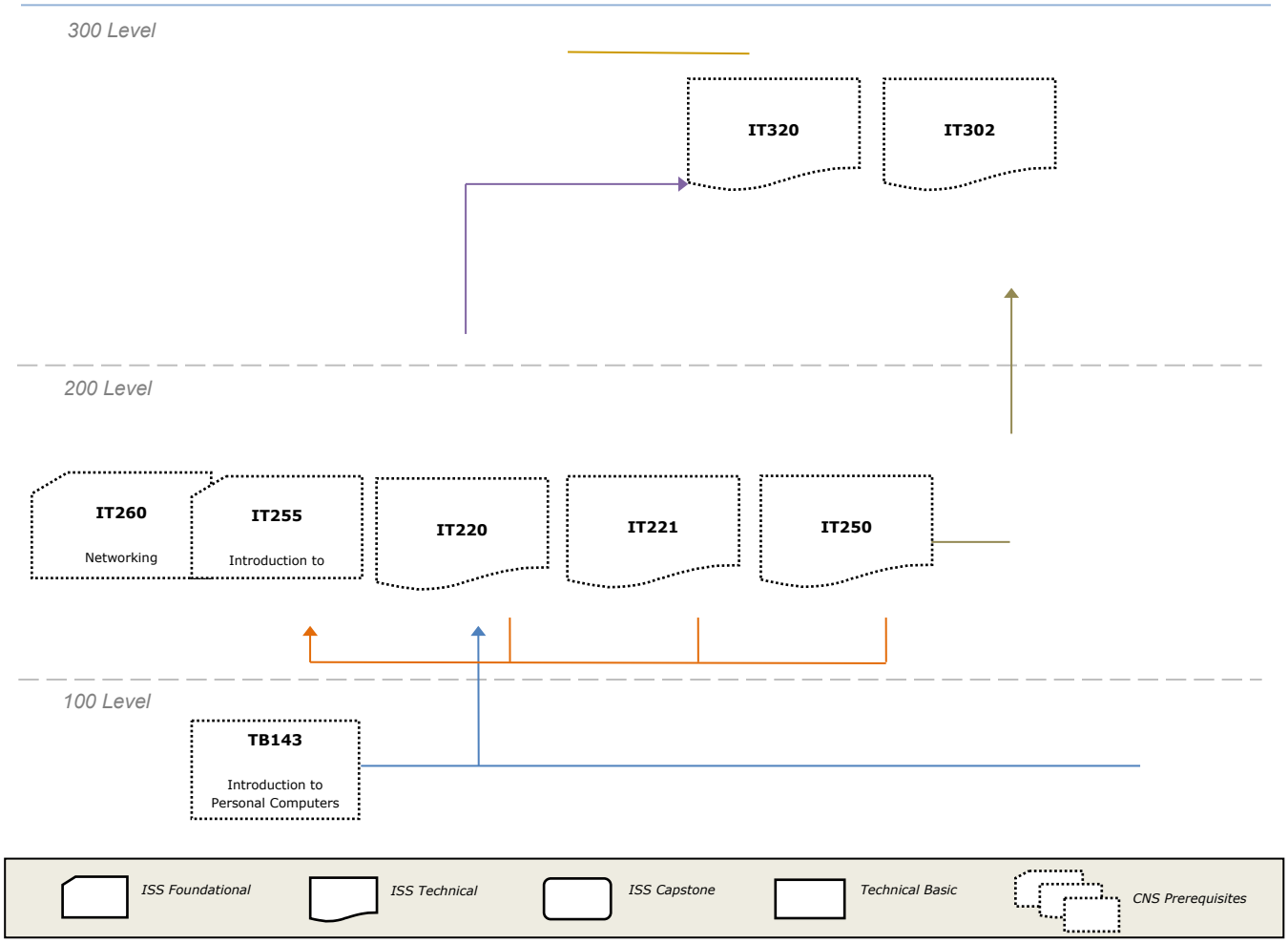
Where Does This Course Belong?

This course is required for the Bachelor of Science in Information Systems Security program. This program covers the following core areas:

- Foundational Courses
- Technical Courses
- BSISS Project

The following diagram demonstrates how this course fits in the program:




300 Level
IT320
IT302
200 Level
IT260
Networking
IT255
Introduction to
IT220
IT221
IT250
100 Level
TB143
Introduction to
Personal Computers
ISS Foundational
ISS Technical
ISS Capstone
Technical Basic
CNS Prerequisites

Major Instructional Areas

1. Solving business challenges with forensic investigations
2. Performing digital forensic investigations
3. Using forensic environments and tools
4. Collecting and handling evidence
5. Making forensic reports

Course Objectives

1. Identify the role of computer forensics in responding to crimes and solving business challenges.
2. Examine system forensics issues, laws, and skills.
3. Examine the purpose and structure of a digital forensics lab.
4. Examine the evidence life cycle.
5. Procure evidence in physical and virtualized environments.
6. Examine the impact of sequestration on the evidence-gathering process.
7. Collect evidence in network and e-mail environments.
8. Examine automated digital forensic analysis.
9. Report investigative findings of potential evidentiary value.
10. Examine the constraints on digital forensic investigations.

SCANS Objectives

SCANS is an acronym for Secretary's Commission on Achieving Necessary Skills. The committee, appointed by the National Secretary of Labor in 1990, created a list of skills and competencies that

continue to be a valuable resource for individuals developing their careers in a high-tech job market. For more information on the SCANS objectives, visit The U.S. Department of Labor Employment and Training Administration: www.doleta.gov.

Learning Materials and References

Required Resources

Textbook Package	New to this Course	Carried over from Previous Course(s)	Required for Subsequent Course(s)
Vacca, John R., and K. Rudolph. *System Forensics, Investigation, and Response*. 1st ed. Sudbury, MA: Jones & Bartlett, 2010.	■		
Printed IS415 Student Lab Manual	■		
ISS Mock IT Infrastructure (1) – Cisco Core Backbone Network consisting of Cisco 2811 routers, 2950/2960 catalyst switches, ASA 5505s for classroom hands-on labs that require a live, IP network. (For onsite only)	■	■	■
ISS Mock IT Infrastructure (2) – VM Server Farm (2 Microsoft Windows XP2003 Standard Servers and 2 Ubuntu Linux Servers) for classroom hands-on VM labs. (For both onsite and online)	■	■	■
ISS Mock IT Infrastructure (2) – VM Workstation (Microsoft Windows XP2003 Professional Workstation with Core ISS Apps and Tools) for classroom hands-on VM labs. (For both onsite and online)	■	■	■
			■

Textbook Package	New to this Course	Carried over from Previous Course(s)	Required for Subsequent Course(s)
Additional VMs, Apps, Tools needed for the Student VM workstation to perform the labs for this course. (For both onsite and online) (3)	■		

(1) The following presents the core ISS Cisco core backbone network components needed for some of the hands-on labs for onsite delivery only. (Note: video labs will be used for online delivery):

- Cisco 2811 Routers
- Cisco 2950/2960 Catalyst Switches
- Cisco ASA 5505 Security Appliances
- Simulated WAN Infrastructure
- EGP using BGP4 or IGP using EIGRP
- Layer 2 Switching with VLAN Configurations
- Telnet and SSH version 2 for Remote Access
- Inside and Outside VLANs
- DMZ VLAN

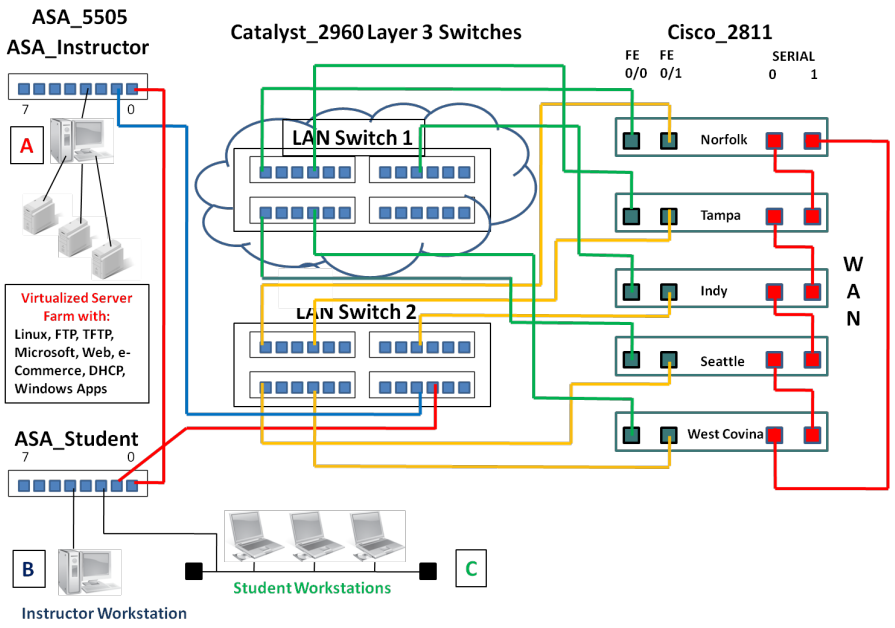


Figure 1 – ISS Cisco Core Backbone Network

(2) The following lists the core ISS VM server farm and VM workstation OS, applications, and tools required for this course for both onsite and online course deliveries:

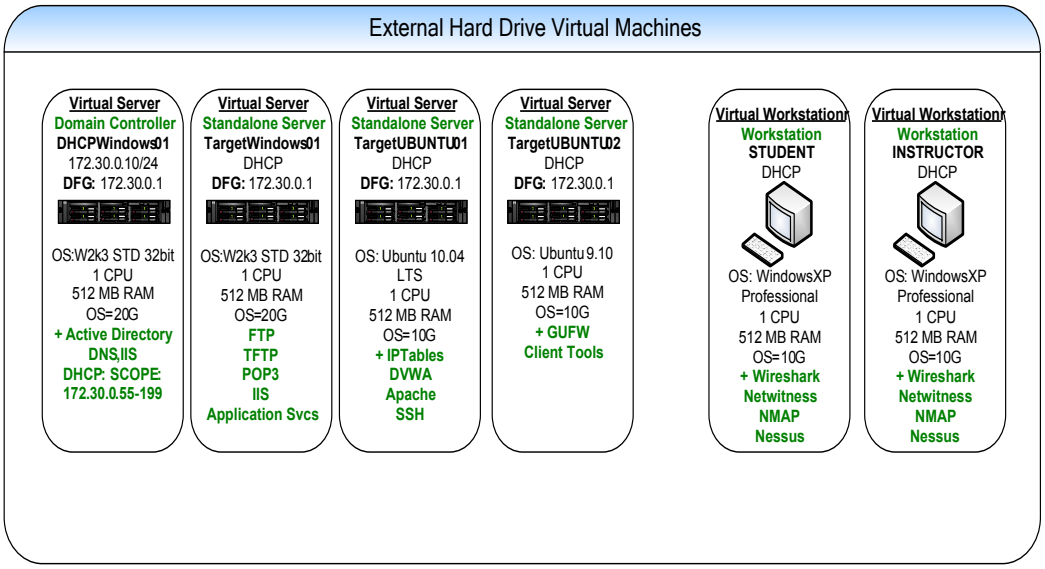


Figure 2 – ISS Core VM Server Farm & VM Workstations

(3) The following lists the new VMs, applications, and tools required to perform the hands-on labs for this course for both onsite and online deliveries:

1. New VM for server farm: “VulnerableXP01”. This VM is a vulnerable Microsoft Windows XP 2003 Standard Edition server used for performing attacks.

2. New VM for server farm: “Backtrack01”. A Backtrack 4 Ubuntu Server pre-loaded with the following applications and tools:

   a. Metasploit with required plug-ins
   b. Kismet
   c. Aircrack-ng
   d. Airsnort
   e. Snort
   f. MySQL
   g. BASE

3. New VM that Replaces the Old “TargetUbuntu01” VM on the VM server farm. An Ubuntu Server 10.4 VM pre-loaded with the following applications and tools:

   a. Damn Vulnerable Web App (DVWA)
   b. ClamAV Installed
   c. Rootkit Hunter: http://www.rootkit.nl/projects/rootkit_hunter.html
   d. Chrootkit: http://www.chkrootkit.org/
   e. Appropriate rootkit tools can be found at:

      http://www.packetstormsecurity.org/UNIX/penetration/rootkits/indexdate.html

f. Infected with EICAR

g. tcpdump

h. Common Linux tools such as strings, sed and grep

4. Tools Directory: A directory called "tools" which contains the binary installation files for each tool covered in the course, including:

a. Infected with EICAR

b. ClamAV Installed

c. Rootkit Hunter: http://www.rootkit.nl/projects/rootkit_hunter.html

d. Chrootkit: http://www.chkrootkit.org/

e. Appropriate rootkit tools can be found at: http://www.packetstormsecurity.org/UNIX/penetration/rootkits/indexdate.html

f. Wireshark

g. Netwitness Investigator

h. FileZilla FTP client/Server

i. Putty SSH client

j. Nessus

k. Zenmap

l. MD5sum

m. SHA1sum

n. GnuPG (Gnu Privacy Guard)

o. OpenSSL

p. VMware Player

Note #1: ISS onsite students can obtain their removable hard drive directly from their ITT campus. ISS online students will be required to download the core ISS VM server farm and VM workstations directly to their personal computer for installation. The ITT Onsite or Online

Instructor will provide students with the specific instructions and procedures for how to obtain the core ISS VM server farm and workstation image files during the first week of class.

Note #2: Installation instructions for installing these new VMs, applications and tools will be provided by the ISS onsite or online Instructor during day 1/ week 1 of the course.

Recommended Resources

Books, Professional Journals

Please use the following author's names, book/article titles and/or keywords to search in the ITT Tech Virtual Library for supplementary information to augment your learning in this subject:

Books

Periodicals

EbscoHost

Books24X7

Hal Berghel

"Hiding data, forensics, and anti-forensics", *Communications of the ACM*, Apr2007, Vol. 50 Issue 4, (Page 15)

Richard A. Clark, et al

"CYBER WAR: The Next Threat to National Security and What to Do About It", *New York Times Book Review*, Aug2010, (Page 16)

Warren G. Kruse, et al

"Computer forensics; incident response essentials", Dec2001, Vol. 25 Issue 4

John R. Vacca

Computer and Information Security Handbook

John R. Vacca

“The essential guide to area networks”, Mar2002, Vol. 26 Issue 1

Professional Associations

- American Academy of Forensic Sciences

  This Web site provides an understanding of advance science and its application to the legal system.

  http://www.aafs.org (accessed September 3, 2010)

- ADFSL-Association of Digital Forensics, Security and Law

  This Web site focuses on the academics and research of digital forensics, security, and law.

  http://www.adfsl.org/ (accessed September 3, 2010)

- DoD Cyber Crime Center

  This Web site provides an understanding about cyber investigation training courses for Department of Defense (DoD) organizations, Defense Criminal Investigative Organizations, military counterintelligence agencies, and law enforcement organizations.

http://www.dc3.mil/dcita/dcitaAbout.php (accessed September 3, 2010)

- HTCIA: High Tech Crime Investigation Association

  This Web site explains the effect of the voluntary exchange of data, information, experience, ideas, and knowledge about methods, processes, and techniques relating to investigations and security in advanced technologies among its members.

  http://www.htcia.org/ (accessed September 3, 2010)

Other References

- e-evidence info: The Electronic Evidence Information Center

  http://www.e-evidence.info (accessed September 3, 2010)

- FBI Laboratory: Computer Analysis and Response Team

  http://www.fbi.gov/hq/lab/org/cart.htm (accessed September 3, 2010)

- National Center for Forensic Science

  http://www.ncfs.ucf.edu (accessed September 3, 2010)

- SANS

  http://www.sans.org (accessed September 3, 2010)

- Computer Crime & Intellectual Property Section: United States Department of Justice http://www.justice.gov/criminal/cybercrime/ (accessed September 3, 2010)

- U.S. Immigration and Customs Enforcement

  http://www.ice.gov/partners/investigations/services/cyberbranch.htm (accessed September 3, 2010)

NOTE: All links are subject to change without prior notice.

Keywords:

- Computer forensics
- Cybercrime
- Data exposure
- Digital forensics
- Forensic investigation
- Forensics
- Sensitive data
- System forensics
- Admissibility
- Chain of custody
- Evidence
- Expert witness
- Forensic investigator competence

- Forensic investigator traits
- Hearsay
- Innocent until proven guilty
- Presumption of innocence
- Privacy laws
- Testimony

Course Plan

Instructional Methods

This course is designed to promote learner-centered activities and support the development of cognitive strategies and competencies necessary for effective task performance and critical problem solving. The course utilizes individual and group learning activities, performance-driven assignments, problem-based cases, projects, and discussions. These methods focus on building engaging learning experiences conducive to development of critical knowledge and skills that can be effectively applied in professional contexts.

Suggested Learning Approach

In this course, you will be studying individually and within a group of your peers. As you work on the course deliverables, you are encouraged to share ideas with your peers and instructor, work collaboratively on projects and team assignments, raise critical questions, and provide constructive feedback.

Use the following advice to receive maximum learning benefits from your participation in this course:

DO	DON'T
▪ Do take a proactive learning approach ▪ Do share your thoughts on critical issues and potential problem solutions ▪ Do plan your course work in advance ▪ Do explore a variety of learning resources in addition to the textbook ▪ Do offer relevant examples from your experience ▪ Do make an effort to understand different points of view	▪ Don't assume there is only one correct answer to a question ▪ Don't be afraid to share your perspective on the issues analyzed in the course ▪ Don't be negative towards the points of view that are different from yours ▪ Don't underestimate the impact of

DO	DON'T
▪ Do connect concepts explored in this course to real-life professional situations and your own experiences	collaboration on your learning ▪ Don't limit your course experience to reading the textbook ▪ Don't postpone your work on the course deliverables – work on small assignment components every day

Course Outline

Unit #	Unit Title	Assigned Readings	Graded Activities			
			Grading Category	#	Activity Title	Grade Allocation (% of all graded work)
1	Introduction to System Forensics	*System Forensics, Investigation, and Response:* ▪ Chapter 1 ▪ Chapter 2 ▪ Chapter 14 (Pages 270–277)	Discussion	1.1	Common Data Threats and Cybercrimes	1
			Lab	1.2	Perform a Byte-Level Computer Audit	2
			Assignment	1.3	Report Cybercrimes	2
2	System Forensics Issues	*System Forensics, Investigation, and Response:* ▪ Chapter 2 ▪ Chapter 3	Discussion	2.1	Investigator or Expert Witness Skills and Qualifications	1
			Lab	2.2	Apply the Daubert Standard on the Workstation Domain	2

Unit #	Unit Title	Assigned Readings	Graded Activities			
						Grade Allocation
			Grading Category	#	Activity Title	(% of all graded work)
		Federal Rules of Evidence, http://www.law.cornell.edu/rules/fre/ (accessed September 13, 2010)	Assignment	2.3	Examine Computer Forensics and Privacy	2
3	Forensics Labs and Software	*System Forensics, Investigation, and Response:* ▪ Chapter 3 ▪ Chapter 4 ▪ Chapter 5	Assignment	3.1	Potential Sources of Data Modification	1
			Lab	3.2	Create a Mock Forensic System Image for Analyzing Forensic Evidence	2
			Assignment	3.3	Create a Digital Forensic Software or Equipment Proposal	2
4	Evidence Life Cycle	*System Forensics, Investigation, and Response:* ▪ Chapter 7 National Institute of Justice: Forensic Examination of Digital Evidence: A Guide for Law Enforcement http://www.ncjrs.gov/pdffiles1/nij/199408.pdf (Pages 2–18) (accessed September 13, 2010)	Assignment	4.1	Identify Chain of Custody Roles and Requirements	1
			Lab	4.2	Uncover New Digital Evidence Using Bootable Utilities	2
			Assignment	4.3	Write a Digital Evidence Procedure	2
5	Evidence Collection	*System Forensics, Investigation, and*	Discussion	5.1	Proper Methods for Capturing Data	1

Unit #	Unit Title	Assigned Readings	Graded Activities			
						Grade Allocation
			Grading Category	#	Activity Title	(% of all graded work)
	Basics	*Response:* ▪ Chapter 5 ▪ Chapter 6 ▪ Chapter 9	Lab	5.2	Automate Evidence Discovery Using Paraben's P2 Commander	2
			Assignment	5.3	Create a Data Recovery Plan	2
6	Hidden Data and Live Monitoring	*System Forensics, Investigation, and Response:* ▪ Chapter 8 ▪ Chapter 9 ▪ Chapter 12	Discussion	6.1	Steganography and Its Implications for Security	1
			Lab	6.2	Apply Steganography to Uncover Modifications to an Image File	2
			Assignment	6.3	Document a Password Recovery Procedure	2
7	Network Evidence Collection	*System Forensics, Investigation, and Response:* ▪ Chapter 10 ▪ Chapter 11 ▪ Chapter 13	Discussion	7.1	Incident Response Team Roles	1
			Lab	7.2	Monitor & Define a Baseline Definition for Network Traffic	2
			Assignment	7.3	Overcome Difficulties of Network Monitoring	2
8	Automated Analysis and Tools	*System Forensics, Investigation, and Response:* ▪ Chapter 5 ▪ Chapter 11 ▪ Chapter 12	Assignment	8.1	Identify Appropriate Analysis Tools	1
			Lab	8.2	Automate Image Evaluations and Identify Suspicious or Modified Files	2
			Assignment	8.3	Create an Analysis Tool Acquisition Proposal	2

Unit #	Unit Title	Assigned Readings	Graded Activities			
						Grade Allocation
			Grading Category	#	Activity Title	(% of all graded work)
9	Evidence Protection and Reporting	*System Forensics, Investigation, and Response:* ▪ Chapter 7 National Institute of Justice: Forensic Examination of Digital Evidence: A Guide for Law Enforcement http://www.ncjrs.gov/pdffiles1/nij/199408.pdf (Pages 19–38) (accessed September 13, 2010)	Assignment	9.1	Provide a Testimony as an Expert Witness	1
			Lab	9.2	Craft an Evidentiary Report for a Digital Forensics Case	2
			Assignment	9.3	Document a Clear Chain of Custody	2
10	Investigation Constraints	*System Forensics, Investigation, and Response:* ▪ Chapter 3 (Page 45) ▪ Chapter 14 ▪ Chapter 15	Discussion	10.1	Implications of Anonymous and Shared Logons	1
			Lab	10.2	Perform an Incident Response Investigation for a Suspicious Login	2
			Assignment	10.3	Write an Acceptable Use Policy	2
11	Course Review and Final Examination	N/A	Project	11.1	Investigate Evidence and Create a Report of the Findings	25
			Exam	11.2	Final Exam	25

Evaluation and Grading

Evaluation Criteria

The graded assignments will be evaluated using the following weighted categories:

Category	Weight
Assignment	24%
Lab	20%
Project	25%
Discussion	6%
Exam	25%
TOTAL	**100%**

Grade Conversion

The final grades will be calculated from the percentages earned in the course, as follows:

Grade	Percentage	Credit
A	90–100%	4.0
B+	85–89%	3.5
B	80–84%	3.0
C+	75–79%	2.5
C	70–74%	2.0
D+	65–69%	1.5
D	60–64%	1.0
F	<60%	0.0

Academic Integrity

All students must comply with the policies that regulate all forms of academic dishonesty, or academic misconduct, including plagiarism, self-plagiarism, fabrication, deception, cheating, and sabotage. For more information on the academic honesty policies, refer to the Student Handbook.

(End of Syllabus)

