

George Mason University
CFRS 762 – Mobile Device Forensics
CRN 73856, Sec 001
Fall 2014, August 29 – December 12, Fridays, 7:20-10:00PM
ENGR 5358

Instructor

Michael Robinson
mrobinsv@gmu.edu
Office Hours: Available upon request

Description

This course will familiarize students with mobile devices and technology used by carriers. Students will identify data that can be retrieved from mobile devices, such as cell phones, smart phones, and GPS devices. Recovered and analyzed data will include address books, call logs, text messages, video files, audio files, and Internet history. Students will correlate data with records from Network Service Providers, e.g., call phone service carriers. Students will apply industry best practices to evidence collection and analysis with hands-on exercises using current tools.

Learning Objectives

Upon completing the course, students will be able to:

- Produce a forensic report that includes the steps in the collection, handling, and preservation of digital evidence from mobile devices, such as cell phones.
- Construct a forensic acquisition plan for mobile devices that will account for various scenarios and the limitations of cell phone technology.
- Validate data obtained from the forensic acquisition of mobile devices with current tools.
- Analyze data retrieved from mobile devices with current tools.
- Assess the differences between cellular network architectures and identify their impact on forensic data.
- Analyze data provided from network service providers and cross-reference the results with data obtained from mobile devices.

Required Materials

Students are to bring the following materials to class:

- At least one USB flash drive (formatted with the FAT32 file system)

The following texts will be used for the class.

Casey, E. (ed.) (2010). *Handbook of Digital Forensics and Investigations*. Elsevier Academic Press. Burlington, MA.

Jansen, W. and Ayers, R. (2014, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. National Institute of Standards and Technology. Gaithersburg, MD.
<http://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.800-101r1.pdf>

Jansen, W. and Delaitre, A. (2009, October). "Mobile Forensic Reference Materials: A Methodology and Reification." National Institute of Standards and Technology Interagency Report (NISTIR) 7617. National Institute of Standards and Technology. Gaithersburg, MD.
<http://csrc.nist.gov/publications/nistir/ir7617/nistir-7617.pdf>

Jansen, W., Delaitre, A., and Moenner, L. (2008, January). "Overcoming Impediments to Cell Phone Forensics." National Institute of Standards and Technology. Gaithersburg, MD.
http://csrc.nist.gov/groups/SNS/mobile_security/documents/mobile_forensics/Impediments-formatted-final-post.pdf

Graded Material

Each assignment, quiz, project, and exam will be graded on a 0-100 point scale.

The final average is calculated by the following weights.

Assignments.....	20%
Quizzes.....	20%
Midterm.....	25%
Hands-on Exercises.....	15%
Final Exam.....	20%
Total.....	100%

The following criteria will be used for the assignment of letter grades

A	92-100
A-	90-91
B+	87-89
B	83-86
B-	80-82
C	70-79
F	0-69

The course will adhere to the university's policies on grading.

Assignment Due Dates

All assignments are to be submitted by the due dates listed in the syllabus. Work will not be accepted late. Assignments are to be submitted via Blackboard.

Class Attendance

Attendance is mandatory. A number of classes will involve the hands-on use of forensics tools, which will be used in the classroom. In the event that a student cannot attend class due to an emergency or crisis, the student is to contact the instructor as soon as possible.

Responsible Use of Computing Policy

Use of computer equipment, including Internet connections within the classroom will be conducted in accordance with the University's Responsible Use of Computing (RUC) Policy. This applies to all academic and operational departments and offices at all university locations owned or leased. The policies and procedures provided herein apply to all Mason faculty, staff, students, visitors, and contractors.

The university provides and maintains general computing services, including web and Internet resources, and telecommunication technology to support the education, research, and work of its faculty, staff, and students. At the same time, Mason wishes to protect all users' rights to an open exchange of ideas and information. This policy sets forth the responsibilities of each member of the Mason community in preserving the security, confidentiality, availability, and integrity of Mason computing resources. To accomplish these ends, this policy supports investigations of complaints involving Mason computing abuse, including sexual harassment, honor code, federal, state, applicable industry, and local law violations.

University faculty and staff members, as state employees, are subject to the Freedom of Information Act, §2.2-3700, et seq., of the Code of Virginia, and all applicable state and federal rules and regulations. While this policy endeavors to maintain user confidentiality, it cannot create, nor should faculty or staff members presume, any expectation of privacy.

Violations of this policy may result in revocation of access, suspension of accounts, disciplinary action, or prosecution. Evidence of illegal activity will be turned over to the appropriate authorities. It is the responsibility of all users of Mason computing resources to read and follow this policy and all applicable laws and procedures (user sign-on agreement).

For more information regarding the RUC Policy, consult the student handbook.

University Policies

This course will be taught in compliance with George Mason University policies, which can be found online at <http://universitypolicy.gmu.edu/>

Important Dates

Last day to drop with no tuition penalty	September 2
Last day to drop with a 33% tuition penalty	September 16
Last day to drop with a 67% tuition penalty	September 26
Thanksgiving Break	November 26-30
Final Exams	December 10-17

The full calendar maintained by the University Registrar can be found online at:
<http://registrar.gmu.edu/calendars/2013fall/>

Office of Disability Services

The Office of Disability Services (ODS) is available to serve all students with disabilities, including those with cognitive (e.g., learning, psychological, and closed head injury), sensory, mobility, and other physical impairments.

The Office of Disability Services serves qualified students with disabilities to ensure equal access to the university's programs and services. A qualified student with a disability is a student with a disability, who meets the academic and technical standards required for admission or participation in the university's educational program and services. As defined in the Americans with Disabilities Act (ADA), and section 504 of the Rehabilitation Act of 1973, a person has a disability if he/she:

- Has a physical or mental impairment which substantially limits one or more major life activities,
or
- Has a record of such impairment, or
- Is regarded as having such impairment

Students requesting assistance should contact the Office of Disability Services at <http://ods.gmu.edu/>

Course Outline

The following is the course outline. It is subject to revision.

Week 1 Introduction to Cell phone forensics

8/29

- Reading assignment Casey, E. (2010). "Chapter 10: Mobile Network Investigations." *Handbook of Digital Forensics and Investigations*. pp. 537-542.
- Jansen, W. and Ayers, R. (2014, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. pp. 48-50.
- Classroom material Introduction.pptx
- "The Growth of Mobile: Stats and figures that will shock you!"
<http://www.youtube.com/watch?v=0aUQLIPdtg8>

Week 2 Mobile Device Usage and Data Artifacts

9/5

- Reading assignment Jansen, W. and Ayers, R. (2014, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. pp. 3-7.
- Casey, E. (2010). "Chapter 10: Mobile Network Investigations." *Handbook of Digital Forensics and Investigations*. pp. 529-532.
- Classroom material Usage_and_Data.pptx
- Assignments Assignment #1 – Current Events
 Due on September 5 by 7:00PM

Week 3 Carrier Technologies

9/12

- Reading assignment Jansen, W. and Ayers, R. (2014, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. pp. 10-14.
- ETSI. "Mobile technologies GSM."
<http://www.webcitation.org/5yRQjyd8W>
- ETSI. "Cellular History."
<http://www.etsi.org/WebSite/Technologies/Cellularhistory.aspx>
- TelecomSpace. "CDMA"
<http://www.telecomspace.com/cdma.html>
- Antipolis, S. (2012, June 1.) "New SIM card format for slimmer, smaller phones." Retrieved from the ETSI website:
<http://www.etsi.org/news-events/news/398-news-release-1-june-2012>

Jansen, W. and Ayers, R. (2007, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. pp. 7-10.

Classroom material	Carriers.pptx
Assignment	Assignment #2 – Data Contained on Mobile Devices Due on September 12 by 7:00PM
Quiz	Quiz 1 (Material from weeks 1 and 2)
Week 4 9/19	Network Service Provider Infrastructure
Reading assignment	Casey, E. (2010). "Chapter 10: Mobile Network Investigations." <i>Handbook of Digital Forensics and Investigations</i> . pp. 517-526.
Classroom material	Infrastructure.pptx
Assignment	Assignment #3 – Carrier Technology Due on September 19 by 7:00PM
Week 5 9/26	Procedures
Reading assignment	Jansen, W. and Ayers, R. (2014, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. pp. 27-47. Ayers, R., Wayne, J., Cilleros, N., and Daniellou, R. (2005). Cell Phone Forensic Tools: An Overview and Analysis. p. 5.
Classroom material	Procedures.pptx Cellebrite Demonstration http://www.youtube.com/watch?v=kET-F_3xuD8 SIM Card Seizure Demonstration http://www.youtube.com/watch?v=fFMPUCrvuo Hands-on demonstrations with phones and tools Paraben Device Seizure Instructions
Assignment	Assignment #4 – Infrastructure Due on September 26 by 7:00PM
Quiz	Quiz 2 (Material from weeks 3 and 4)

Week 6 Impediments to Cell Phone Forensics

10/3

- Reading assignment Jansen, W., Delaitre, A., and Moenner, L. (2008). "Overcoming Impediments to Cell Phone Forensics." Proceedings of the 41st Hawaii International Conference on System Sciences. National Institute of Standards and Technology.
<http://www.forensicswiki.org/images/9/9c/JensenCellPhones.pdf>
- Classroom material Impediments.pptx
- Assignment Assignment #5 – Procedures
Due on October 3 by 7:00PM

Week 7 Mid-term

10/10

Week 8 Comparison and Contrast of Current Industry Toolsets

10/17

- Reading assignment Ayers, R., Jansen, W., Moenner, L., and Delaitre, A. (2007). Cell Phone Forensic Tools: An Overview and Analysis Update. NISTIR 7387.
- Jansen, W. and Ayers, R. (2014, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. pp. 15-26.
- Casey, E. (2010). "Chapter 10: Mobile Network Investigations." *Handbook of Digital Forensics and Investigations*. pp. 410-412.
- Classroom material Forensic_Tools.pptx
- Chip-off_Forensics.pptx
- Hands-on Exercises/Acquisitions to be conducted
- Assignment Assignment #6 –Recommendations
Due on October 17 by 7:00PM

Week 9 Acquisition I

10/24

- Reading assignment Jansen, W. and Ayers, R. (2014, May). "Guidelines on Cell Phone Forensics." Special Publication 800-101. Revision 1. pp. 50-52.
- Classroom material UFED_Acquisition.pptx
- DS_Acquisition.pptx

		BitPim_Acquisition.pptx
		Hands-on Exercises/Acquisitions to be conducted
	Assignment	Assignment # 7 – Forensic Tools Recommendations Due on October 24 by 7:00PM
Week 10 10/31	Acquisition II	
	Reading assignment	Jansen, W. and Ayers, R. (2014, May). “Guidelines on Cell Phone Forensics.” Special Publication 800-101. Revision 1. pp. 27-47.
	Classroom material	Kindle.pptx
		SIM Acquisition.pptx
		TomTom-GPS.pptx
		“Bourne SIM clone” http://www.youtube.com/watch?v=3_eYMfggkqQ
		“Paraben’s SIM Card Seizure software demo” http://www.youtube.com/watch?v=fFMPUCPrvu0
		Hands-on Exercises/Acquisitions to be conducted
	Quiz	Quiz 3 (Material from weeks 8 and 9)
Week 11 11/7	Legal Interception of Data	
	Reading assignment	Casey, E. (2010). “Chapter 10: Mobile Network Investigations.” <i>Handbook of Digital Forensics and Investigations</i> . pp. 542-556.
	Classroom material	Legal_Interception.pptx
		Hands-on Exercises/Acquisitions to be conducted
Week 12 11/14	Call Detail Records (CDRs) and other Data from Network Service Providers	
	Reading assignment	Jansen, W. and Ayers, R. (2014, May). “Guidelines on Cell Phone Forensics.” Special Publication 800-101. Revision 1. pp. 52-55. Casey, E. (2010). “Chapter 10: Mobile Network Investigations.” <i>Handbook of Digital Forensics and Investigations</i> . pp. 527-528.
	Classroom material	NSP-data.pptx
		Tower_Info.pptx

Geolocating.pptx

EXIF_Data.pptx

Other Fun Stuff – Analyzing EXIF Data

Assignment

Assignment #8 – FISA
Due November 14 by 7:00PM

Quiz

Quiz 4 (Material from weeks 10 and 11)

Week 13 Interpreting Recovered Data

11/21

Reading assignment

Casey, E. (2010). "Chapter 10: Mobile Network Investigations." *Handbook of Digital Forensics and Investigations*. pp. 517-526.

Classroom material

Mapped_CDR.pptx

Cell_Site_Analysis.pptx

Hands-on Exercises/Acquisitions to be conducted

Assignment

Assignment #9 – Cell Tower Assignment (.pptx)
Due on November 21 by 7:00PM

Week 14 Mobile Malware

12/5

Reading assignment

Android Developers. (2011, June 7). "Security Permissions." <http://developer.android.com/guide/topics/security/security.html>

(Anonymous). (2011, March 20). "Breaking out of Android Sandbox." <http://pfalcon-oe.blogspot.com/2011/03/breaking-out-of-android-sandbox.html>

McMillan, R. (2011, January 17). "Coming Soon: A New Way to Hack into Your Smartphone." http://www.pcworld.com/businesscenter/article/216842/coming_soon_a_new_way_to_hack_into_your_smartphone.html

Morgan, B. (2002, November 15). "J2ME Security: Now and in the Future." <http://www.informit.com/articles/article.aspx?p=30029>

Knudsen, J. (2003, February). "Understanding MIDP 2.0's Security Architecture." <http://developers.sun.com/mobility/midp/articles/permissions/>

Classroom material	Malware on Exploits.pptx
	Malware on Mobile Platforms.pptx
Assignment	Project Due by December 5 by 7:00PM

Week 15 Final Exam
12/12