Course Syllabus

University of Maryland - Shady Grove Campus
CCJS 498I: Selected Topics in Criminology and Criminal Justice
Computer and Digital Forensics
Fall 2016 - Section SG91

Course Information

Day/Time: Wednesday, 12:30 PM – 3:00 PM

Location: Shady Grove Campus, Building III, Room 4212

Course description: An introduction to the methods used in the seizure and forensic analysis of computers, cell phones, and other digital evidence. Students will be familiarized with the use of digital evidence in criminal investigations, relevant case law in computer crime and digital evidence, and the challenges faced by law enforcement. Students will be introduced to the computer forensic tools used by today's law enforcement agencies and basic computer/data storage concepts. This course will include some basic practical application of these tools and concepts in a computer lab environment.

Required reading:

Professor - Contact Information

John Conroy, M.S., CFCE, CDFE

E-mail: [Redacted] (primary) [Redacted] (secondary)

Phone: [Redacted] (work/office)
It is preferred that students contact me via e-mail primarily, since e-mails go to my iPhone.

Office hours: Office hours are provided by appointment (typically before and/or after class). Students may make an appointment at any time during class or via e-mail.
## Grading

<table>
<thead>
<tr>
<th>Grading Scale</th>
<th>97 - 100 points</th>
<th>94 - 97 points</th>
<th>90 - 94 points</th>
<th>87 - 89 points</th>
<th>84 - 87 points</th>
<th>80 - 83 points</th>
<th>77 - 79 points</th>
<th>74 - 77 points</th>
<th>70 - 73 points</th>
<th>67 - 69 points</th>
<th>64 - 67 points</th>
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## Grading Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Percentage of Final Grade</th>
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<tbody>
<tr>
<td>Class Participation</td>
<td>10% of final grade</td>
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<tr>
<td>Mid-Term Exam</td>
<td>25% of final grade</td>
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<tr>
<td>Labs/Scenarios</td>
<td>20% of final grade</td>
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<tr>
<td>Final Project/Mock investigation</td>
<td>20% of final grade</td>
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<tr>
<td>Final Exam</td>
<td>25% of final grade</td>
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## Class Participation / Attendance Policy

Students are expected to participate in class. There will be various opportunities throughout the course to participate. Students will earn class participation points by attending class on time and participating in class discussions and asking/responding to questions in class. For each class that a student attends on time and actively participates, the student will receive 3 class participation points. Missed classes, late arrivals, and failure to participate will result in reduction of points. An unexcused absence will result in the loss of class participation points for that day. It is not possible to participate in class if you are not present in class. Students are asked not to use cell phones or be distracting to others during class. Students are permitted to use laptop computers in class for note-taking purposes and use relating to class. Students who use cell phones and computers in class for any other reasons than those permitted by this syllabus will be penalized class participation points. A student's final class participation grade will be calculated at the end of the semester and will account for 10% of the student's final grade for the course.

An excused absence is an absence for which the student has the right to receive, and the instructor has the responsibility to provide, academic accommodation. Students are expected to take full responsibility for their own academic work and progress. Students, to progress satisfactorily, must meet all of the requirements of each course for which they are registered. Students are expected to attend classes
regularly. Consistent attendance offers students the most effective opportunity to gain command of course concepts and materials. Excused absences must be requested promptly and must be supported by appropriate documentation.

Absences stemming from work duties other than military obligation (e.g., unexpected changes in shift assignments) and traffic/transit problems do not typically qualify for excused absence. Events that justify an excused absence include:

- Religious observances
- Mandatory military obligation
- Illness of the student or illness of an immediate family member
- Participation in university activities at the request of university authorities
- Compelling circumstances beyond the student's control (e.g., death in the family, required court appearance)

Excused absences do not alter the academic requirements for the course. Students are responsible for information and material missed on the day of absence. Students are, within reason, entitled to receive any materials provided to the class during the absence. Students are responsible for making provision to determine what course material they have missed and for completing required exercises in a timely manner. Students with excused absences will be entitled to a makeup exam at a mutually-agreed upon time between the professor and the student. However, students are reminded that except for emergencies, such arrangements must be made prior to the exam or assignment in which the student will miss due to an excused absence.

Course Related Policies

Students are strongly encouraged to review the University's course-related policies and their rights related to various topics including: Academic Integrity, Code of Student Conduct, Sexual Misconduct, Discrimination, Accessibility, Attendance/Absences/Missed Assignments, Student Rights, Official UMD Communication, Mid-Term Grades, Complaints About Course Final Grades, Copyright and Intellectual Property, Final Exams, Course Evaluations, and Campus Resources. Students should view these policies at the following URL. Additionally, these policies are posted on ELMS with this courses syllabus.

http://www.ugst.umd.edu/courserelatedpolicies.html

Inclement weather policy / Emergency evacuation

In case of inclement weather, contact the Shady Grove campus hotline 301-738-6012. If class is cancelled for any reason, I will contact all students as soon as I am aware of the cancellation via e-mail and/or Elms/Canvass. Students may also sign up to receive electronic notification via www.shadygrove.umd.edu/weather/. In case of emergency, follow the emergency procedures discussed the first day of class and as posted in the building.

Students are strongly encouraged to sign up for the Shady Grove Campus Alert System (which is separate from the UMD College Park Alert System), at http://shadygrove.umd.edu/ (Click “USG Alerts” on the lower right-hand corner and sign up with one or multiple phone numbers and e-mail addresses.
Mid-Term and Final Exams

Students will be required to take a mid-term exam on 09/28/16 from 12:30 AM to 3:00 PM and a final exam on 12/16/16 from 08:00 AM to 10:00 AM. The mid-term and final exams will consist of multiple choice and true/false questions. Unless prior permission is given, all students are required to take the examination on the day it is administered. Before the mid-term and final exams an extensive exam review will be conducted. Students are strongly encouraged to attend these sessions. Excusal/make-up examinations will only be authorized for reasons consistent with University of Maryland policy. If prior permission is not obtained, students will receive a zero ("0") for that examination. If a make-up exam is granted, the make-up exam will consist of different questions than those originally offered. Both the mid-term and final exams will each account for 25% each of the student's final grade in the course. The final exam will be cumulative, covering material that may have also been covered in the mid-term.

Labs/Scenarios

During this course, there will be several "hands-on" exercises to demonstrate computer forensic tools and other software/concepts. These exercises will be scenario-based, and during each exercise students will answer a series of questions about the scenario/lab. The goal of these labs/scenarios is to familiarize students with the capabilities of computer forensic tools in the field, not to require students to conduct full computer forensic examinations. Students will only be expected to demonstrate that they have learned the concepts taught in this course. These labs are not like tests or quizzes; they will practical exercises guided by the instructor. During the labs, students will be permitted to ask questions of the instructor. Though these labs are designed to be an individual effort, students will be permitted to guide and help each other as necessary. These labs/scenarios will account for 20% of the student's final grade in the course.

Final Project / Mock investigation

For the final lab (last two classes), students will be broken up into groups. Each group will be assigned a scenario/mock investigation to complete and be given a thumb drive containing digital evidence. Using the concepts and methods from this course, students will complete a report about their scenario/mock investigation. The report will also include actions that students would take next to further the investigation. Students will be provided with an example of a basic report. On the last day of class, students will present their scenarios and reports to the class. Students will be graded on the accuracy and thoroughness of the information reported/presented. In lieu of a report in Microsoft Word or document format, students may submit their reports in PowerPoint format. Reports are expected to be 3-5 pages or 5-9 PowerPoint slides. In these mock investigations, students will be expected to demonstrate what they have learned throughout the course, including the labs. This final project / mock investigation will account for 20% of the student's final grade in the course.

Academic Integrity

The University of Maryland has a nationally recognized Code of Academic Integrity. The Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. All students are expected to know and adhere to the Code of Academic Integrity, which is designed to ensure that the principle of academic honesty is upheld. All members of the University community share the responsibility and authority to challenge and make known acts of apparent academic dishonesty. All
cases of suspect academic misconduct will be referred to the Student Honor Council at University of Maryland, College Park. Examples of violations of the Code of Academic Integrity include:

- Cheating: fraud, deceit, or dishonesty in any academic course or exercise in an attempt to gain an unfair advantage and/or intentionally using or attempting to use unauthorized materials, information, or study aids in any academic course or exercise.

- Fabrication: intentional and unauthorized falsification or invention of any information or citation in an academic course or exercise.

- Facilitating Academic Dishonesty: intentionally or knowingly helping or attempting to help another to violate any provision of this Code.

- Plagiarism: intentionally or knowingly representing the words or ideas of another as one’s own in any academic course or exercise.

Cheating on any assignment or exam may result in the following disciplinary action: "XF" (a "cheating F") will be the grade earned for the course and you may face possible expulsion from the University of Maryland. Students are expected to write, sign, and/or agree to the Honor Pledge for all exams, papers, projects, and other graded materials:

* I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination.

Students Requiring Special Accommodations

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The University of Maryland provides reasonable accommodations to qualified individuals. Disability Support Services (DSS) facilitates reasonable accommodations to qualified individuals. For assistance in obtaining an accommodation, contact Disability Support Service at 301.314.7682, or dissup@umd.edu.

Students that have an Accommodations Letter from DSS should bring this to the attention of the course instructor as soon as possible (within the first two weeks of class) in order to facilitate necessary accommodations. All requests requiring special accommodations will be addressed in accordance with University of Maryland policies.

Course Evaluations

Your participation in CourseEvalUM course evaluations is both your right and responsibility as a student. Your feedback is confidential and important to the improvement of teaching and learning at the University of Maryland as well as to the tenure, promotion, and retention of its instructors. You can go directly to the website (www.courseevalum.umd.edu) to complete your evaluations.
**Intellectual Property**

The lectures delivered in course and the course materials that are created/distributed in this course are protected by federal copyright law. Students are permitted to take notes and will be given access to class PowerPoint slides and other course material via Elms/Canvass. Students may not reproduce or distribute the lectures, slides, presentation material, articles, or other course material without explicit written consent from the instructor. Any student who wishes to record the all or part of this course must receive prior permission from the instructor. Recording any conversation in the State of Maryland is violation of Maryland Criminal Law.

**Classes / Topics**

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<th>For first class:</th>
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<tr>
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<td>• Textbook - Forward</td>
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<td>• Textbook - Chapter 1</td>
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<td>• Textbook - Chapter 2 (pages 21-33 and pages 48-50 only)</td>
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<tr>
<td>Class 1 08/31/16</td>
<td>Introduction / Course Overview / Syllabus Review / Forensic Lab</td>
<td>Accreditation and Certification</td>
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<td>• Textbook - Chapter 3, Sections:</td>
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<tr>
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<td>◦ “Introduction to Electronic Discovery” (pages 63-65)</td>
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<td>◦ “Legal Context” (pages 66-73)</td>
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<td>◦ “Case Management” (pages 74-77)</td>
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<td>• ELMS Reading Assignment: “Strengthening the Forensic Sciences”</td>
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<td>◦ Read ONLY Section 1: Accreditation of Forensic Service</td>
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<td>Providers (pages 3-8) AND Section 2: Certification of</td>
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<td>Forensic Examiners (pages 9-13)</td>
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<td>• ELMS Reading Assignment: “A digital forensic practitioner’s</td>
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<td>guide to giving evidence in a court of law” by Shayne</td>
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<td>• ELMS Reading Assignment: “Cross-examination of the Computer</td>
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<td>Forensics Expert” by Craig Ball</td>
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<p>| Class 2 09/07/16| Digital Forensics and the Law                                   |                                                                 |
|                | Digital Evidence in Court eDiscovery                           |                                                                 |
|                | For next class:                                                |                                                                 |
|                 | • ELMS Reading Assignment: “Windows Operating System and        |                                                                 |
|                 |     Forensic Implications” by John Conroy                       |                                                                 |
|                 | • ELMS Reading Assignment: “Data Forensics”                    |                                                                 |
|                 | • ELMS Reading Assignment: “The Visible PC”                    |                                                                 |
|                 | • ELMS Reading Assignment: “The Complete PC Tech”              |                                                                 |
|                 | • ELMS Reading Assignment: “Functions of an Operating System”  |                                                                 |
|                 | • ELMS Reading Assignment: “Understanding Removable Media”     |                                                                 |</p>
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| 3      | 09/14/16 | **Computer Hardware**  
**Computer File Systems and Operating Systems**  
Textbook – Chapter 2 - Section “Encryption and Steganography” (pages 39-40 only)  
Textbook - Chapter 3 - Sections:  
“Identification of Electronic Data” (pages 78-82)  
“Forensic Preservation of Data” (pages 83-88)  
ELMS Reading Assignment: “Documenting and Managing the Crime Scene”  
ELMS Reading Assignment: “Knowing What Your Digital Devices Create, Capture, and Pack Away”  
ELMS Reading Assignment: “Extracting Hidden Data” |               |
| 4      | 09/21/16 | **The Digital Crime Scene / Digital Evidence Seizure**  
Forensic Imaging and Acquisition  
Encryption and Steganography  
Mid-Term Review | Study for mid-term exam. |
| 5      | 09/28/16 | **CLASS WILL MEET IN COMPUTER LAB-BUILDING III, Room 2215**  
Mid-term Exam |               |
|        |          | For next class:  
Textbook – Chapter 5: Windows Internet and Communications Activities (pages 279-284 only)  
ELMS Reading Assignment: “Email and Web Forensics”  
ELMS Reading Assignment: “How the Internet Works” |               |
| 6      | 10/05/16 | **Basic Networking and the Internet**  
Internet/Web/E-mail Investigations and Forensics |               |
|        |          | For next class:  
Textbook – Chapter 2: pages 33-48 only  
Textbook – Chapter 4: pages 135-180 and 188-191 only |               |
| 7      | 10/12/16 | **Cyber/Network Intrusions and Incident Response**  
Introduction to Cyber Security / Cyber Investigations |               |
|        |          | For next class:  
Textbook - Chapter 3, Section: “Data Processing” (pages 104-132)  
ELMS Reading Assignments: TBD – Please check ELMS after 09/28/16 in the “Files” and “Reading Assignments Section” |               |
| 8      | 10/19/16 | **CLASS WILL MEET IN COMPUTER LAB-BUILDING I, Room 217**  
Digital Forensics Analysis: Tools and Methods  
LAB — Digital Forensics Analysis: Tools and Methods |               |
|        |          | For next class:  
Textbook – Chapter 5: pages 209-215  
ELMS Reading Assignments: TBD – Please check ELMS after 09/28/16 in the “Files” and “Reading Assignments Section” |               |
<table>
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<tr>
<th>Class</th>
<th>Date</th>
<th>Class Meeting Information</th>
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| Class 9 | 10/26/16 | CLASS WILL MEET IN COMPUTER LAB-BUILDING I, Room 217  
Digital Forensics Analysis: Tools and Methods  
LAB --- Digital Forensics Analysis: Tools and Methods  
For next class:  
- Textbook, Chapter 5: page 230-232 only / page 263 only / pages 273-279 only  
- ELMS Reading Assignments: TBD — Please check ELMS after 09/28/16 in the “Files” and “Reading Assignments Section” |
| Class 10 | 11/03/16 | CLASS WILL MEET IN COMPUTER LAB-BUILDING I, Room 217  
Digital Forensics Timeline Analysis  
Memory Forensics  
LAB --- Memory Forensics and Timeline Analysis  
For next class:  
- Textbook, Chapter 10: pages 517-545 only |
| Class 11 | 11/09/16 | CLASS WILL MEET IN COMPUTER LAB-BUILDING I, Room 217  
Criminal Investigations and Cell Phone Evidence  
Cell Phone and Wireless Device Forensics  
LAB --- Cell Phone and Wireless Device Forensics  
For next class:  
- ELMS Reading Assignment: “Casey-Digital Evidence on Mobile Devices” |
| Class 12 | 11/16/16 | CLASS WILL MEET IN COMPUTER LAB-BUILDING I, Room 217  
Cell Phone and Wireless Device Forensics  
Cell Phone and Wireless Device Forensics — LAB |
| Class 13 | 11/30/16 | CLASS WILL MEET IN COMPUTER LAB-BUILDING I, Room 217  
Mock Investigations Project / Final Lab |
| Class 14 | 12/07/16 | CLASS WILL MEET IN COMPUTER LAB-BUILDING I, Room 217  
Mock Investigations Project / Final Lab  
Final Exam Review |
| FINAL  | 12/16/16 | CLASS WILL MEET IN COMPUTER LAB-BUILDING III, Room 2215  
FINAL EXAM  
Final Lab Project/Mock Investigations Due  
08:00 AM to 10:00 AM |