

Course Syllabus

University of Maryland - Shady Grove Campus

CCJS 498I: Selected Topics in Criminology and Criminal Justice

Digital Forensics

Fall 2023 - Section SG91

Course Information

Day/Time: Wednesday, 2 PM – 4:30 PM

Location: Shady Grove Campus, Building III, Room 2216

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:

- Textbook: "Handbook of Digital Forensics and Investigation", Eoghan Casey (ISBN 13:978-0-12-374267-4 Elsevier Academic Press, 2011)

Professor - Contact Information

John Conroy, M.S., CFCE, CCI, CCCE

- 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.

Michael Yu, B.S., CFCE, CCCE

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Grading

Grading Scale		
A		90 – 100 points
B		80 - 89 points

Grading Criteria	
Class Participation	10% of final grade
Mid-Term Exam	25% of final grade
Labs/Scenarios	20% of final grade
Final Project/Mock investigation	20% of final grade
Final Exam	25% of final grade

C		70 – 79 points
D		60 – 69 points
F		0 - 60 points

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.

Please note that this course follows the university's "Excused Absence Policy" as outlined on <https://www.ugst.umd.edu/courserelatedpolicies.html> and <https://www.president.umd.edu/sites/president.umd.edu/files/files/documents/policies/V-100G.pdf>

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.

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.

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.**

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

Please note that this course will follow the University's "course related policies" detailed above and these are incorporated into this syllabus herein by reference.

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 **10/11/23 from 2:00 PM to 4:30 PM** and a final exam on **12/06/2023 from 2:00 PM to 4:30 PM**. 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 mid-term exam will be taken in class and will be **open-book/open-notes**. The final exam will be taken in class and will be **closed book**. 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 be 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 assigned a final project/mock investigation to complete and be provided digital evidence to review and report on. 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. Students will be graded on their ability to apply all of the concepts learned in this course to their mock investigation/scenario as well as accuracy and thoroughness of the information reported. Reports are expected to be 6-10 pages (of written content) and may vary in length depending on how the student chooses to format their report. This may result in the student going over 10 pages. A report containing a large number of screenshots, for example, could be likely over 10 pages. 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.

As extra credit (which will be applied to either the final exam or the final project, whichever is lower) students will be able to produce a PowerPoint presentation of 5-10 slides and present that presentation to the instructor via Zoom. Students electing to do the extra credit presentation will need to notify the instructor no later than **11/15/2023 11:59 PM via e-mail**.

Academic Integrity

You should be familiar with UMD's Academic Integrity Policy, which applies in this course:
<https://president.umd.edu/sites/president.umd.edu/files/files/documents/policies/III-100A.pdf>

UMD maintains a commitment to the principles of truth and academic honesty. Accordingly, the Code of Academic Integrity is designed to ensure that the principle of academic honesty is upheld. While all members of the University share this responsibility, the Code of Academic Integrity is designed so that special responsibility for upholding the principle of academic honesty lies with you as a student.

To promote academic honesty on campus you will be asked by your course instructors to write by hand and sign the following pledge on every examination, paper or other academic exercise. Writing this pledge will serve as a reminder of your commitment to academic integrity.

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

Failure to sign the pledge is not a violation of the Code of Academic Integrity, but neither is it a defense in case of violation of this Code. Students who do not sign the pledge will be given the opportunity to do so. Refusal to sign must be explained to the instructor. Signing or non-signing of the pledge will not be considered in grading or judicial procedures. Material submitted electronically should contain the pledge, submission implies signing the pledge. On examinations, no assistance is authorized unless given by or expressly allowed by the instructor. On other assignments, the pledge means that the assignment has been done without academic dishonesty, as defined below.

The pledge is a reminder that you as a University of Maryland student carry the primary responsibility for academic integrity. The meaningfulness of your degree depends on it. Academic dishonesty is a corrosive force in the academic life of a university. It jeopardizes the quality of education and depreciates the genuine achievements of others. All members of the University community—students, faculty, and staff share the responsibility and authority to challenge and make known acts of apparent academic dishonesty.

Code of Academic Integrity defines five major types of Academic Dishonesty:

- **CHEATING:** fraud, deceit, or dishonesty in any academic course or exercise in an attempt to gain an unfair advantage and/or using or attempting to use unauthorized materials, information, or study aids in any academic course or exercise.
- **FABRICATION:** unauthorized falsification or invention of any information or citation in an academic course or exercise.
- **FACILITATING ACADEMIC DISHONESTY:** knowingly helping or attempting to help another to violate any provision of this Code.

- **PLAGIARISM:** representing the words or ideas of another as one's own in any academic course or exercise.
- **SELF-PLAGIARISM:** the reuse of substantial identical or nearly identical portions of one's own work in multiple courses without prior permission from the current instructor or from each of the instructors if the work is being submitted for multiple courses in the same semester.

The Office of Student Conduct will contact you if you have been reported for a violation of the Code of Academic Integrity. Your course instructor may or may not mention the report to you. The instructor may not grade or record the grade of an assignment that is related to the report. Information about the resolution options are outlined in the University of Maryland Code of Academic Integrity. Note that the normal sanction for a violation is the grade of "XF" for the course.

To promote academic honesty on campus you will be asked by your course instructors to type, agree to, or write by hand and sign the following pledge on every examination, paper or other academic exercise. Writing this pledge will serve as a reminder of your commitment to academic integrity: ***I pledge on my honor that I have not given or received any unauthorized assistance on this examination.***

Accessibility / Students Requiring Special Accommodations

This course follows the University's policy on Course Accessibility / Special Accommodations outlined here: [VI-1.00\(D\) University of Maryland Disability & Accessibility Policy and Procedures](#)

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 also 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. Reasonable accommodations shall be made in a timely manner and on an individualized and flexible basis.

Discrimination against individuals on the grounds of disability is prohibited. The University also strictly prohibits retaliation against persons arising in connection with the assertion of rights under this Policy.

Accessibility & Disability Service (ADS) facilitates reasonable accommodations to qualified individuals. For assistance in obtaining an accommodation, contact Accessibility and Disability Service at [301.314.7682](tel:301.314.7682), or adsfrontdesk@umd.edu. More information is available at counseling.umd.edu/ads/.

After receiving an Accommodations Letter from ADS, as a student you are expected to meet with each course instructor, to provide them with a copy of the Accommodations Letter and to obtain their signature on the Acknowledgement of Student Request form. You and your instructors will discuss a plan for how the accommodations will be implemented in the course throughout the semester. Specific details regarding the implementation of certain ADS approved accommodations agreed upon between you as the student and the individual course instructor must be documented on a Detailed Implementation Plan, signed by you and the instructor, and submitted to ADS. You as the student are responsible for submitting the signed copy of the Detailed Implementation Plan to ADS and retaining a copy for your records.

For further assistance, contact adsfrontdesk@umd.edu or 301-314-7682.

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.

Copyright and Intellectual Property

Class lectures and other course materials are copyrighted and may not be reproduced for anything other than your personal use without the permission of the course instructor. Course materials are the property of the course instructor – do not sell them, do not post them on a website. Be aware that copyright infringements may be referred to the Office of Student Conduct.

As a student, you own the work that you create as part of your University academic and research activities. Full details and a few limitations are found within the policy.

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. Access or license to course material (including presentations, lectures, written documentation, etc.) does not constitute waiver of intellectual property rights/copyright and does not transfer ownership of said material to the student. 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 and written consent from the instructor. Recording any conversation without the express permission of all parties involved in the State of Maryland is violation of Maryland Criminal Law.

Classes / Topics

For first class:		<ul style="list-style-type: none"> ● Textbook – Forward [OPTIONAL] ● Textbook - Chapter 1 [OPTIONAL] ● Textbook - Chapter 2 (pages 21-33 and pages 48-50 only) [OPTIONAL]
Class 1	08/30/23	<p>Topics:</p> <ul style="list-style-type: none"> ● Introduction / Course Overview / Syllabus Review ● Forensic Lab Accreditation and Certification <p>Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> ● Textbook - Chapter 3, Sections [ALL TEXTBOOK SECTIONS OPTIONAL]: <ul style="list-style-type: none"> ○ “Introduction to Electronic Discovery” (pages 63-65) ○ “Legal Context” (pages 66-73) ○ “Case Management” (pages 74-77) ● ELMS Reading Assignment: “Strengthening the Forensic Sciences” ● Read ONLY Section 1: Accreditation of Forensic Service Providers (pages 3-8) AND Section 2: Certification of Forensic Examiners (pages 9-13) ● ELMS Reading Assignment: “A digital forensic practitioner’s guide to giving evidence in a court of law” by Shayne Sherman ● ELMS Reading Assignment: “Cross-examination of the Computer Forensics Expert” by Craig Ball
Class 2	09/06/23	<p>Topics:</p> <ul style="list-style-type: none"> ● Digital Forensics and the Law ● Digital Evidence in Court ● eDiscovery <p>Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> ● 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”
Class 3	09/13/23	<p>Topics:</p> <ul style="list-style-type: none"> ● Introduction to Digital Investigations ● Cyber/Network Intrusions and Incident Response ● Cyber/Insider Threat Investigations

<p>For next class: Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> ● 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” 		
Class 4	09/20/23	<p>Topics:</p> <ul style="list-style-type: none"> ● Computer Hardware and Operating Systems ● Hiding Data: Encryption and Evidence Collection Challenges ● The Digital Crime Scene / Digital Evidence Seizure
<p>For next class: Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> ● 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” 		
Class 5 LAB	09/27/23	<p>Location: <i>This class will be held in-person, at SG III-216 @ 2 PM ET</i></p> <p>Topics:</p> <ul style="list-style-type: none"> ● Forensic Imaging and Acquisition <p>Labs:</p> <ul style="list-style-type: none"> ● LAB 1: Digital Evidence Collection and Imaging
<p>For next class: Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> ● Textbook – Chapter 2: pages 33-48 only ● Textbook – Chapter 4: pages 135-180 and 188-191 only 		
Class 6	10/04/23	<p>Location: <i>This class will be held in-person, at SG III-216 @ 2 PM ET</i></p> <p>Topics:</p> <ul style="list-style-type: none"> ● Digital Forensics Analysis: Tools and Methods ● Mid-Term Review
<p>Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> ● Study for Mid-Term 		

Class 7	10/11/23	<p>Location: <i>This class will be held in-person, at SG III-216 @ 2 PM ET</i></p> <p>Exams:</p> <ul style="list-style-type: none"> • Mid-term Exam
<p>For next class: Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> • Textbook - Chapter 3, Section: "Data Processing" (pages 104-132) • ELMS Reading Assignments: TBD – Please check ELMS after 10/11/18 in the "Files" and "Reading Assignments Section" 		
Class 8	10/18/23	<p>Topics:</p> <ul style="list-style-type: none"> • Basic Networking and the Internet • Internet/Web/E-mail Investigations and Forensics • Business E-mail Compromise Investigations
<p>For next class: Reading Assignments for Next Class:</p> <ul style="list-style-type: none"> • Textbook – Chapter 5: pages 209-215 • ELMS Reading Assignments: TBD – Please check ELMS after 10/18/18 in the "Files" and "Reading Assignments Section" 		
Class 9 LAB	10/25/23	<p>Location: <i>This class will be held in-person, at SG III-216 @ 2 PM ET</i></p> <p>Topics:</p> <ul style="list-style-type: none"> • Digital Forensics Analysis: Tools and Methods <p>Labs:</p> <ul style="list-style-type: none"> • LAB 2: Digital Forensics Analysis: Tools and Methods (Axiom)
<p>For next class: Reading Assignments for Next Class:</p>		

		<ul style="list-style-type: none"> • Textbook, Chapter 5: page 230-232 only / page 263 only / pages 273-279 only • ELMS Reading Assignments: TBD – Please check ELMS after 10/25/18 in the “Files” and “Reading Assignments Section”
Class 10	11/01/23	Location: <i>This class will be held in-person, at SG III-216 @ 2 PM ET</i> Topics: <ul style="list-style-type: none"> • Non-Standard Device Forensics: Forensic Analysis of Vehicles, Drones, IOT Devices
For next class: Reading Assignments for Next Class: <ul style="list-style-type: none"> • Textbook, Chapter 10: pages 517-545 only 		
Class 11 LAB	11/08/23	Location: <i>This class will be held in-person, at SG III-216 @ 2 PM ET</i> Topics: <ul style="list-style-type: none"> • Digital Forensics Analysis: Tools and Methods Labs: <ul style="list-style-type: none"> • LAB 3 - Digital Forensics Analysis: Tools and Methods (Autopsy)
For next class: Reading Assignments for Next Class: <ul style="list-style-type: none"> • ELMS Reading Assignment: “Casey-Digital Evidence on Mobile Devices” 		
Class 12 LAB	11/15/23	Location: <i>This class will be held in-person, at SG III-216 @ 2 PM ET</i> Topics: <ul style="list-style-type: none"> • Cell Phone and Mobile Device Forensics Labs: <ul style="list-style-type: none"> • LAB 4 – Cell Phone and Mobile Device Forensics • Final Lab/ Mock Investigation Assigned
Class 13 LAB	11/29/23	Labs: <ul style="list-style-type: none"> • Final Lab / Mock Investigation
Class 14	12/06/23	Exams: <ul style="list-style-type: none"> • FINAL EXAM Labs:

		<ul style="list-style-type: none">• Final Lab / Mock Investigation Due