Course Syllabus

Principles of Data Science Forensics

DTSC 4420
Spring 2026

Instructor Information

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Class Meets Classroom: Online, Wednesday 5:00pm – 7:00pm
Office Hours: Online zoom by appointment; https://unt.zoom.us/j/3301959592
Teaching Assistants (TAs): TBD
TA Hours: Online by appointment
Prerequisites: No prerequisites

Course Communication: This course will have a website on UNT Canvas for online discussion and assignment submissions. Students are welcome to make an appointment with the instructor and/or the teaching assistant (TA) to discuss course-related questions during office hours.

Course Description, Structure, and Objectives

This course offers a comprehensive overview of the principles and practices of digital investigation, with a strong emphasis on the role of data science in digital forensics. Students will learn techniques and procedures for conducting data-driven investigations, focusing on extracting, analyzing, and interpreting data from digital sources. The course highlights the analysis of physical storage media and large datasets, applying data science methodologies to enhance the identification and recovery of digital evidence. Key phases of digital investigations such as data preservation, acquisition, and analysis—are explored, with a focus on structured and unstructured data residing in hard drives, memory, and other digital environments.

Catalog Course Description: Principles of Data Science Forensics introduces students to the essential skills and best practices for collecting, analyzing, and interpreting data in cyber forensic investigations. The course emphasizes systematic gathering and analysis of digital evidence, leveraging data-driven methodologies to solve cyber-crimes. Students will engage with widely used forensic tools and techniques, focusing on their application in both civil and criminal contexts involving law and technology. Additionally, the course covers the management of digital forensic operations within modern business environments, integrating data science principles to enhance investigative outcomes.

Course Structure

This course is structured into weekly modules spanning 13 weeks. Each week, one chapter will be covered through either two 1.5-hour sessions or one 3-hour session. A mid-term exam will be held at the midpoint of the course.

Topics

Topics to be covered (as time allows) include:

- Introduction to digital investigation and digital evidence
- Data acquisition from physical storage devices
- Examination of file systems, with a focus on Microsoft Windows and Linux environments
- File system analysis and data recovery techniques
- File carving and document analysis
- Information hiding techniques and steganography
- Time analysis, registry, and password recovery
- Email and database forensics

- Memory acquisition and analysis
- Cloud forensics
- Forensics reports

Course Learning Objectives: After completing the course, you will:

1. Gain an understanding of the digital forensics' profession, including data acquisition, crime scene processing, incident investigation, and report writing.
2. Develop proficiency in using current digital forensics tools to recover graphics files and other data types.
3. Learn techniques for validating and analyzing digital forensics data across email, social media, mobile devices, and cloud platforms.
4. Understand the severity of fraud and its impact on individuals, consumers, and organizations.
5. Acquire skills to effectively organize and write comprehensive forensic reports.

How to Succeed in this Course

Office hours offer you an opportunity to ask for clarification or find support with understanding class material. Come visit me! I encourage you to contact me and/or my TA for support. Additional office hours, in person and virtually, will be offered as the semester concludes. Your success is our goal.

ADA accommodation statement:
The University of North Texas makes reasonable accommodation for students with disabilities. To request accommodations, you must first register with the Office of Disability Access (ODA) by completing an application for services and providing documentation to verify your eligibility each semester. Once your eligibility is confirmed, you may request your letter of accommodation. ODA will then email your faculty a letter of reasonable accommodation, initiating a private discussion about your specific needs in the course.

You can request accommodation at any time, but it's important to provide ODA notice to your faculty as early as possible in the semester to avoid delays in implementation. Keep in mind that you must obtain a new letter of accommodation for each semester and meet with each faculty member before accommodations can be implemented in each class. You are strongly encouraged to meet with faculty regarding your accommodations during office hours or by appointment. Faculty have the authority to ask you to discuss your letter during their designated office hours to protect your privacy. For more information and to access resources that can support your needs, refer to the Office of Disability Access website (https://studentaffairs.unt.edu/office-disability-access).

UNT strives to offer a high-quality education in a supportive environment where you can learn, grow, and thrive. As a faculty member, I am committed to supporting you, and I want to remind you that UNT offers a range of mental health and wellness services to help maintain balance and well-being. Utilizing these resources is a proactive way to support your academic and personal success. To explore campus resources designed to support you, check out mental health services (https://clear.unt.edu/student-support-services-policies), visit unt.edu/success, and explore unt.edu/wellness. To get all your enrollment and student financial-related questions answered, go to scrappysays.unt.edu.

Supporting Your Success and Creating an Inclusive Learning Environment

Every student in this class should have the right to learn and engage within an environment of respect and courtesy from others. We will discuss our classroom's habits of engagement and I also encourage you to review UNT's student code of conduct so that we can all start with the same baseline civility understanding (Code of Student Conduct) (https://policy.unt.edu/policy/07-012).

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Required/Recommended Materials

Course Materials (Text, calculator, etc.) [Optional]

- Textbook information (title, author, date and edition, publisher, cost, where available)
  - Bill Nelson, Amelia Phillips, Christopher Steuart, ***Guide to Computer Forensics and Investigations*** *Sixth Edition*. Cengage Learning, 2018, ISBN-13: 978-1-337-56894-4. **[Book NPS]**

    GitHub - hvva/OpenForensics: A book about how to conduct digital forensic investigations with free and open source tools.
- Supplementary materials and/or readings
  - File System Forensic Analysis, by Brian Carrier, Addison-Wesley, ISBN 0321268172, 2005.
  - Handbook of Digital Forensics and Investigation, by Eoghan Casey, Academic Press, ISBN 0123742676, 2009.
  - Cases and Research papers studies (links will be provided)
- Technology requirements for courses with digital materials:

  This course has practical lab or exercise that you need to perform yourself at home, and I recommend using an old laptop – that may need to reform as necessary and a private internet connection. To fully participate in this class, students will need internet access to reference content on the Canvas Learning Management System and zoom. If circumstances change, you will be informed of other technical needs to access course content. Information on how to be successful in a digital learning environment can be found at Learn Anywhere (https://online.unt.edu/learn).

Course Grading Policies

1. There will be 10 Discussions for class participation. You are allowed to positively comments on other discussions.
2. There will be **12 Homework assignments**. The purpose of these assignments is to keep you current with the class. Each assignment carries a certain number of points depending on difficulty level.
3. There will be **12 quizzes** throughout the course and one every week.
4. There will be one mid-term exam.
5. There will be **a group project/test**, students get to form work groups of 5 or less students and decide on the topic to do research on, then deliver a final report and presentation.
6. Students are required to participate in the weekly **discussion forums**, **paper review** (if posted), and submit an evaluation for the projects presented by other groups as peer review assignments.

Course Assignment, Examination, and/or Project Policies

Scores breakdown: (tentative, i.e. is subject to change)

	Evaluation/Assessment Topics	%	Points
1	Class Participation/Discussion	10%	10x 10 = 100 points
2	10 - 12 Homework Assignments/Labs	30%	10 x 40 = 400 points
3	10 – 12 Quizzes	10%	10 x 10 = 100 points
4	Mid-term	20%	200 points
5	Final Exam/Project	20%	200 points

The final letter grade will be assessed based on the following point accumulations:

- Letter grade of "A": 90% to 100% (i.e., 900 to 1000 points)
- Letter grade of "B": 80% to 89%
- Letter grade of "C": 70% to 79%
- Letter grade of "D": 60% to 69%
- Letter grade of "F": 0% to 59%

Course Topics - Tentative Calendar of Readings, Topics, and Due Dates

Week	Topics	Chapter Readings	Assignments (Homeworks HWs, Quizzes Qs)
#1 (Jan 14)	Understanding the Digital Forensics Profession, Investigations, and Reports	NPS Chapter 1	Study on Forensics Tools
#2 (Jan 21)	Investigator's Office and Laboratory	NPS Chapter 2	**Due: Jan 25** HW1, Q1
# 3 (Jan 28)	Data Acquisition	NPS Chapter 3	**Due: Feb 1** HW2, Q2
#4 (Feb 4)	Processing Crime and Incident Scenes	NPS Chapter 4	**Due: Feb 8** HW3, Q3
#5 (Feb 11)	Working with Windows and CLI Systems	NPS Chapter 5	**Due: Feb 15** HW4, Q4
#6 (Feb 18)	Current Digital Forensics Tools	NPS Chapter 6	**Due: Feb 22** HW5, Q5
#7 (Feb 25)	Linux and Macintosh File Systems	NPS Chapter 7	**Due: March 01** HW6, Q6
(March 04)	**Mid-Term**	**NPS Chapter 1 to 6**	**Mid-term**
#8 (March 18)	Recovering Graphics Files	NPS Chapter 8	**Due: March 15** HW7, Q7
#9 (March 25)	Digital Forensics Analysis and Validation	NPS Chapter 9	**Due: March 22** HW8, Q8
#10 (April 1)	Virtual Machine, Live Acquisitions, and Network Forensics	NPS Chapter 10	**Due: March 29** HW9, Q9
#11 (April 8)	Email and Social Media Forensics	NPS Chapter 11	**Due: April 05** HW10, Q10
#12 (April 15)	Mobile Device Forensics, Cloud Forensics	NPS Chapter 12, 13	**Due: April 12** HW11, Q11
#13 (April 22)	Report Writing for High Tech Investigations Expert Testimony in High Tech Investigations	NPS Chapter 14, 15	**Due: April 19** HW12, Q12
#14 (April 29)	Ethics for the Investigator and Expert Witness	NPS Chapter 16	
Final	**Final Exam/Project**		**TBD**

NPS – Book* - *Bill Nelson, Amelia Phillips, Christopher Steuart,* ***Guide to Computer Forensics and Investigations*

Course Requirements/Schedule

Assessing Your Work

In addition to standards for success in courses, there are UNT policies and procedures that you may list or link to in your syllabus. You can access these policies on the Student Support Services & Policies page (https://clear.unt.edu/student-support-services-policies). To encourage students to read and absorb these important processes, you can use a syllabus quiz to check for understanding. A 10-question quiz about current institutional policies and resources is available in

Canvas Commons. To access and upload the quiz to your course, follow the Syllabus Quiz Access directions (https://acrobat.adobe.com/link/track?uri=urn:aaid:scds:US:58ff8b2b-e3e5-47c1-a6a7-d3d35bdb82a9).

Use of GenAI tools:

Permitted Use: *In this course, you are encouraged to use Generative AI (GenAI) tools such as [e.g., ChatGPT, Gemini] to support your learning and develop skills for a GenAI-oriented workforce. This use will help us stay technically proficient and ethically grounded. However, GenAI should complement, not replace, our course materials. If something seems unclear, feel free to ask.*

I use GenAI [e.g., ChatGPT, Gemini] to enhance materials, streamline tasks, generate prompts, create scenarios, draft syllabi, build study guides, analyze performance. I will always disclose how I use GenAI, and I expect the same from you. In accordance with the UNT Honor Code, unauthorized use of GenAI tools is prohibited. Using GenAI content without proper credit or substituting your own work with GenAI undermines the learning process and violates academic integrity. If you're unsure whether something is allowed, please seek clarification.

Using GenAI to complete any part of an assignment, exam, or coursework will be considered a violation of academic integrity, as it prevents the development of your own skills, and will be addressed according to the Student Academic Integrity policy (https://policy.unt.edu/policy/06-003).

Syllabus about policies

Every student in my class can improve by doing their own work and trying their hardest with access to appropriate resources. Students who use other people's work without citations will be violating UNT's Academic Integrity Policy. Please read and follow this important set of guidelines for your academic success (https://policy.unt.edu/policy/06-003). If you have questions about this, or any UNT policy, please email me or come discuss this with me during my office hours.

Attendance and Participation

Research has shown that students who attend class are more likely to be successful. You should attend every class unless you have a university excused absence such as active military service, a religious holy day, or an official university function as stated in the Student Attendance and Authorized Absences Policy (PDF) (https://policy.unt.edu/policy/06-039). If you cannot attend a class due to an emergency, please let me know. Your safety and well-being are important to me.