

# CSC/ECE 574 Course Syllabus

## Computer and Network Security

Spring 2026

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### Instructor Information

Name	Email	OFFICE HOURS
Prof. Brad Reaves	<a href="mailto:bgreaves@ncsu.edu">bgreaves@ncsu.edu</a>	After class or by appointment. <a href="#">Book Here</a>
TA Hamim Hamid	<a href="mailto:hhamid@ncsu.edu">hhamid@ncsu.edu</a>	By appointment.
TA Moshe Ikechukwu	<a href="mailto:mcikechu@ncsu.edu">mcikechu@ncsu.edu</a>	By appointment.

### Preferred Method of Communication & Response Time

**All class communications from students, public or private, should take place on Ed.** This should be your first go-to resource for any questions about course structure, deadlines, class material, or any other course concerns. The instructor or TA strive for a two-business day response time. When appropriate, make the question viewable to everyone so that the answer can benefit all students. For sensitive matters (e.g., grading), make a private post. The instructional staff receives emails from Ed, so any questions posted to Piazza will be addressed as fast or faster than any sent by email.

**The instructional staff will not reply by email.** Emails will be reposted anonymously to Ed on a student's behalf and answered there. If it is possible to publish the question without revealing sensitive information, we will make the question public.

**You are expected to track all content on Ed.** Assignment details will be clarified, due dates modified, and other important material will be there. We strongly encourage you to set Ed to forward to your email.

**Use professional norms** on Ed. You should learn and follow [Stack Overflow's question guidelines](#); these are norms you will be expected to know in industry and academia. In general, your messages should always be clear. Use correct grammar, spelling, and usage.

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## Course Information

**Course Web Platforms:** [Moodle](#) Courseware | [Ed](#) Discussion | [Panopto](#) Class Recordings | [Schedule](#) | [Syllabus](#)

**Meeting Time and Location:** TTh 16:30 - 17:45, 1230 Engineering Building 2

**Course Credit Hours:** 3

## Catalog Description

Fundamentals of computer security and privacy, including security models, policies, and mechanisms. Cryptography for secure systems, including symmetric and asymmetric ciphers, hash functions, and integrity mechanisms. Authentication of users and computers. Network attacks and defenses at the network and application layers. Common software vulnerabilities and mitigation strategies. Secure operating systems and seminal access control models and policies. Principles of intrusion detection. Privacy, including considerations of end-user technologies.

## Course Description

This course provides a graduate-level introduction to computer and network security and privacy. Students successfully completing this class will be able to evaluate works in academic and commercial security. The course covers four key topic areas: basics of cryptography and crypto protocols, network security, systems security, and privacy. Readings primarily come from seminal papers in the field. A detailed list of lecture by lecture contents, assignments, and due dates (subject to change as semester evolves) is available on the course [Schedule](#).

## Course Goals

The goal of CSC/ECE 574 is to provide students with a foundation of computer security fundamentals. It is the first of a set of courses security PhD students and MS students who pursue the MS Track in Security or MS in Cybersecurity will take, and it serves as an introduction to material that will be covered in later security electives in cryptography, network security, software security, systems security, and privacy. It is also suitable as a single elective for MS students and PhD students who wish to enrich their education with an expanded base of computer security experience. After graduation, students can use the material of this course to design, analyze, and critique secure computing designs.

## Structure

The majority of this course is synchronous, delivered through real-time, face-to-face class sessions. Additional materials and activities are delivered through Moodle, an online learning platform.

This course meets in-person twice a week. Content is primarily delivered via lectures with integrated learning activities. The course will consist of reading reports, a midterm, a final, and three mini-projects or a research project. A detailed list of lecture by lecture contents, assignments, and due dates (subject to change as semester evolves) is available on the course schedule.

**Project:** Students may choose either the [Research Project] track or the [Mini-Projects] track. The Research Project track will require the student to execute novel research in systems and network security or privacy. The result of the project will be a conference-quality paper. The Mini-projects track will provide a series of smaller projects that relate more directly to the course material. The projects require a range of programming as well as open-ended investigation.

**Reading Reports:** Students will read seminal research papers in computer security throughout the semester and submit very brief worksheets termed "reading reports" for each paper. There will generally be one paper per week, with occasional "bye weeks" without a paper assigned due to breaks or significant deadlines. Generally, students should budget a few hours per week for reading, and 15-30 minutes to complete the report. **Up to 10% of exam points may cover key ideas from papers not discussed in class.**

## Prerequisites/Corequisites

**Formal Prerequisites:** [CSC 316 or ECE309] and [CSC 401 or ECE407] or equivalent.

**Informal Prerequisites:** I assume students have the equivalent of a comprehensive computer science or computer engineering bachelor's degree that covered operating systems, networks, discrete mathematics, and programming in multiple languages. Students are expected to have functional knowledge of the Linux command line. They should also be able to pick up a new programming language (e.g., Python) with relative ease. Students without prior classes on these topics have done well after increased individual study. Students without this background have struggled to complete the course

## Minimum Technical and Digital Information Literacy Skills

This is a graduate-level course in computer science and engineering. Students are expected to have effortless command of desktop computing environments and commonly used

professional applications. Students are also expected to have functional knowledge of Unix/Linux command line usage. They should also be able to pick up and use a new programming language (e.g., Python) with relative ease. Students are expected to have practice with debugging and troubleshooting computer hardware, software, and networked systems.

Student should also be able to locate and identify references and other resources that support their learning objectives and project goals. They should be able to analyze digital information for credibility, relevancy, currency, and bias. They should cite their sources correctly and accurately.

## Artificial Intelligence

### Generative AI

Generative AI is remarkable for transforming semantics from one form to another: software designs to code; reports to summaries; descriptions to images. For an experienced hand who can oversee and correct errors, these are powerful tools.

Unfortunately, the tasks that GenAI excels at are the same tasks that experts assign to novices for training in a [“performance, feedback, and revision”](#) cycle. This cycle is at the core of all human learning. The “performance” step is the hardest, most time consuming, and most critical.

In this course, you **may not** use generative AI tools to *create* or *revise* content that is core to something you are being evaluated on. For example, you may not have AI write portions of your mini-reviews. You must not have AI outline sections of your project deliverables, or convert outlines you write into full text. That is critical practice you must perform.

I **do** encourage you to use GenAI tools for **feedback**. You may upload a draft of text you write and ask for critiques or improvement recommendations, as long as you are the one who writes the revisions.

I also encourage you to use GenAI to explain tricky background information or to learn general concepts, but make sure that you check against real sources to guard against confabulation.

If you wish to do so, you may use GenAI for immaterial or non-evaluated activities in this course. For example, you may use GenAI to create theme images for presentation slides.

Students have told me they use GenAI because they believe that it can generate better text than they can. As novices, that’s probably true. However, GenAI will never develop a unique style; it also will not transfer the skills from writing to your personal conversations; it will not expand your vocabulary. In many ways, thinking is writing and writing is thinking. GenAI might be able to write, but it can’t think or have spontaneous insights. And if the machine is doing your writing, it’s distracting you from thinking.

I expect your draft submissions to look like they were written by students still learning the process, and it would be silly for me to expect otherwise. No writer's early drafts were good; I know mine weren't (and often still aren't). I want to see where you are and help you get to where you need to be, and I can't do that if the machine is doing the work.

You may use sample code, open source code, and AI generated code (e.g., ChatGPT, Copilot) in ways consistent with professional practice and the licenses of that code. When you do so, you should always **include a reference to the source**. Not only is this important academic practice, it's an important habit in your professional work outside of class. Tracking and monitoring code provenance and dependency, explicit and implicit, is an increasingly important aspect of software engineering and security.

In assignments that teach program and code design, you must not use these outside sources to create graded code. To help you understand the distinction, let's discuss a line of code that prints a formatted number. In a CS1 class, this is often the whole objective of an assignment, and an important step in learning both a language and metalearning needed to be an effective programmer. In that class, print code should not come from another source. If we are discussing a graduate security course where an assignment is to build an encrypted chat client, print code can be reasonably reused (if cited!) but encryption and networking code should not be.

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## Learning Outcomes

By the end of this course, students will be able to:

- **Fundamentals:** Specify a security model for a given computer system
- **Crypto:** Explain and apply concepts related to applied cryptography, including plaintext, ciphertext, symmetric cryptography, asymmetric cryptography, digital signatures.
- **Authentication:** Outline the requirements and mechanisms for identification and authentication of users and computer systems, including authentication protocols and key management. Identify the possible threats to each mechanism and ways to protect against these threats.
- **Network:** Identify common network and application layer attacks and defense mechanisms.
- **Software:** Explain and identify instances of common software vulnerabilities and mitigations.
- **System:** Explain concepts related to access control and operating system security, including access control matrices, ACLs and capabilities, protection, reference monitors, least privilege, discretionary access control, mandatory access control.

- **Privacy:** Identify and explain common privacy definitions, techniques, and systems that preserve or reduce privacy.
  - **Research:** Read and interpret bleeding-edge academic research papers on computer and network security and privacy, and describe how the results impact real systems and people.
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## Course Materials

### No Required Textbook

### Other Required Materials

Students undertaking the research track may propose a project in such a way that they need to purchase equipment or materials; the specific items and costs will be dictated by the student proposal.

### Optional Materials

These books are excellent references and alternative presentations of course material:

- Network Security: Private Communication in a Public World by Kaufman, Perlman, Speciner, and Perlman. 3rd Edition only. ISBN: 978-0136643609.
  - Ross Anderson. [Security Engineering](#), 2nd Edition. Wiley. April 2008.
  - Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone. [Handbook of Applied Cryptography](#). CRC Press. October 1996.
  - Paul C. Van Oorschot. [Computer Security and the Internet: Tools and Jewels](#). Springer. 2020. **Note:** Author's [self-archived version](#) is freely available.
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## Technology Requirements

NC State University Libraries offers [Technology Lending](#), where many devices are available to borrow for a 7-day period. Computer labs are available in various locations around campus for student use.

## Computer

NC State's Online and Distance Education provides [technology requirements and recommendations](#) for computer hardware. You will not need a laptop for this course.

## Other Devices

None.

## Software and Digitally-Hosted Course Components

The following software and tools will be used in this course:

- [Moodle and Wolfware](#)
  - [Moodle Accessibility Statement](#)
  - [Moodle Privacy Policy](#)
  - [NC State Privacy Policy](#)
- [Zoom](#)
  - [Zoom Accessibility Statement](#)
  - [Zoom Privacy Policy](#)
- [Panopto](#)
  - [Accessibility Features](#)
  - [Privacy Policy](#)
- [Ed](#)
  - [Piazza Accessibility Statement](#) - Please use <https://piazza.com/lite> with assistive technology
  - [Piazza Privacy Policy](#)
- Linux desktop/laptop or Virtual Machine software to run Linux

## Other Student Expenses

Students have to provide their own transportation for any and all class related trips. This course does not require activities that pose physical risk to students. None.

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# Communication Guidelines

## Respecting Our Learning Community

### Health and Participation in Class:

We are most concerned about your health and the health of your classmates and instructors/TAs.

- If you feel unwell, even if you suspect you are not contagious, please do not attend any in-person classes.
- If you need to make a request for an academic consideration related to COVID-19 or other illness, such as a discussion about possible options for remote learning, please talk with the instructor.

### Identity Statement:

I aim to treat all of my students with respect, and an important part of that is addressing students with correct names and pronouns. If you would like to be called by a different name or pronoun, let me know (in person or Ed). Also, if I mispronounce your name, please let me know -- it is not intentional!

## Plan for Interaction Between Instructors and Students

The instructor's goal is to help students gain a clear understanding of the course material, to foster a deep interest in the topic of computer security, and develop the basic research skills essential to a career at the frontiers of technology. With security, the devil is often in the details, and crucial understanding often relies on subtleties. Accordingly, it is natural for students to struggle both with the content of this course and with requisite background material.

To this end, the instructional staff are providing a number of mechanisms for support. These include:

- **In-class Activities** including lectures and Q&A opportunities.
- **Summative Evaluation** on submitted work.
- **Ed** The course will feature a Ed message board. This should be your first go-to resource for any questions about course structure, deadlines, class material, or anything else that could possibly be relevant to other students.
- **Panopto** I will make recorded lectures available to you to aid in studying or to help in catching up after absences.

- **Office Hours** Students are highly encouraged to come to office hours with the instructor or TAs to discuss doubts about course material, concerns about course performance, or to discuss computer security beyond what can be discussed in class.

If at any time you have constructive suggestions about how to improve the course, feel free to share them with the instructor during office hours or via a private Piazza message.

## Grading and Feedback

### Grading Criteria, Details, and Timing of Feedback

Percentage of Grade	Component	Details and Timing of Feedback
40%	Projects	Students may choose either the Research Project track or the Mini-Projects track. For research project, the final paper submission will comprise half of the project portion of the final grade.
25%	Midterm	I aim to give the midterm with sufficient lead time to have a grade before the drop date.
25%	Final Exam	Your grade will be reported in Moodle.
10%	Reading Reports	Each report will be evaluated for <b>earnest completion</b> on a "pass/fail" basis. The reading report component of the final grade will be the ratio of passed papers to the total. I anticipate each report will be worth approximately 1 point on the final average.

Modifications to the timing of grades/feedback, if required, will be announced via email.

## Grading Scale

The final average will be converted to letter grade using the scale in NC State [REG 02.50.03](#). I will not approve audit or pass/fail enrollment.

## Grade Disputes

If a student believes that a grading error has been made, they should contact the instructional staff *by private message on Ed* clearly and objectively detailing the error and how the student believes it should be corrected. *Grading corrections will not be discussed without a request in writing.*

If the grading issue is clerical or otherwise obvious (e.g., error in tabulation), it will be considered at any time. If the grading issue concerns a subjective grade judgement, including a request for partial credit, it will not be considered before the last week of the semester.

While the staff are always happy to correct errors on our part (e.g., transcription errors, overlooked submissions, etc.), grade disputes concerning subjective elements must have an *incredibly compelling and reasonable* argument, supported by external evidence, to prevail.

Note that unreasonable requests for regrades may result in the entire assignment being regraded, with the distinct possibility that previously overlooked errors will be penalized.

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## Course Schedule

See the [course schedule](#). Note that the schedule is subject to change as the semester evolves. Students should be in the habit of checking this regularly.

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## Course Policies

### Proctored Exams

Students in in-person sections will take exams in the classroom at the assigned times.

Students in distance sections are responsible for arranging their own proctoring.

## Late Assignments

Out of class assignments may be submitted up to 48 hours after the deadline without penalty.

After 48 hours, each additional 24 hour period will result in a final score decrease of 20 points. Students with legitimate reasons (university excused absence, illness, major research deadline) may request an additional extension from the instructor *before the original deadline*.

## Incomplete Grades, Withdrawals

Assignments not completed by the end of the course will receive a grade of **zero** unless the student requests an Incomplete (IN) grade and a reasonable plan of completion is agreed upon with the instructor.

## Attendance

The instructor will not take formal attendance at class meetings. Students missing class should consult classmates on missed material and review recorded lectures.

The university policy on excused absences will be observed (see [REG 02.20.03](#)). The students are responsible for discussing makeup exams if they miss exams due to excused absence. The instructor will choose a mutually agreed date and time for the makeup exam. Travel on university business (conferences, etc.) is excused.

Occasionally, in-person students plan personal travel that overlaps with the course schedule, especially at the beginnings and ends of semesters. Those students are responsible for meeting all deadlines and keeping up with course material. Under no circumstances will the instructor provide written approval for or otherwise facilitate missing scheduled classes except in compliance with the university excused absence policy.

Related NC State Policy: [REG 02.20.03 – Attendance Regulations](#)

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## University Policies

### Academic Integrity and Honesty

Students are required to comply with the university policy on academic integrity found in the [Code of Student Conduct 11.35.01](#) sections 8 and 9. Therefore, students are required to uphold

the Pack Pledge: "I have neither given nor received unauthorized aid on this test or assignment." Violations of academic integrity will be handled in accordance with the Student Discipline Procedures.

Please refer to the [Academic Integrity web page](#) for a detailed explanation of the University's policies on academic integrity and some of the common understandings related to those policies.

### **Course-Specific Academic Integrity Policy:**

All assignments and activities in this class are designed to help you learn. Shirking them comes at a cost of your own growth, the growth of others who depend on your work, and the reputation of this university as a place that produces outstanding engineers and researchers.

In this class, academic integrity means that you actually do the work that is asked of you. Your submissions will solely be the results of your knowledge and effort. In times where it is appropriate, if you include content or results that are from the work of others, you will always say so clearly.

If I find instances of highly unlikely similarity in submissions (code or prose), all parties involved will be presumed to have violated the academic integrity policy and consequences will follow. Proper citation of the source of the code or text will be a successful defense against charges of academic misconduct, so proper documentation of code provenance is strongly encouraged.

### **Consequences:**

This course is designed for the highest caliber of students we have, and the expectations for good conduct are also high. Even small improprieties will have **severe** consequences. At a minimum, it will zero out the grade of the assignment. A more likely consequence will be a recommendation to fail the course. *Moderate* cases of academic integrity will see me recommend suspension or expulsion. All cases of suspected integrity violations will be reported to the Academic Integrity Office.

Willingness to fail is an important part of being a successful technologist, as is the resiliency to keep working after failure. Many of my projects have failed. Failure is not shameful, but dishonesty is.

## **Ethics Statement**

This course considers topics involving personal and public privacy and security. As part of this investigation we will cover technologies whose abuse may infringe on the rights of others. As an instructor, I rely on the ethical use of these technologies. Unethical use may include circumvention of existing security or privacy measurements for any purpose, or the

dissemination, promotion, or exploitation of vulnerabilities of these services. Exceptions to these guidelines may occur in the process of reporting vulnerabilities through public and authoritative channels. Any activity outside the letter or spirit of these guidelines will be reported to the proper authorities and may result in dismissal from the class. This is a very serious issue – violations may not just be immoral, they may violate federal laws.

When in doubt, please contact the course professor for advice. Do not undertake any action which could be perceived as technology misuse anywhere and/or under any circumstances unless you have received explicit permission from the instructor.

Students are also encouraged to read and adhere to the [ACM Code of Ethics and Professional Conduct](#). Note that building secure and privacy-respecting systems is considered an *ethical obligation*, not merely a suggestion, by the ACM.

## Student Privacy

- Software may be used in this course to determine the originality of student submissions.
- In-class sessions are recorded in such a way that might also record students in this course. These recordings may be used beyond the current semester or in other settings outside of this course. Contact your instructor if you have concerns.
- Students may be required to disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings, where relevant to the course. Examples include online discussions of class topics and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

## Other Policies

Students are responsible for reviewing the NC State University PRR's which pertain to their course rights and responsibilities:

- [Equal Opportunity and Non-Discrimination Policy Statement](#) and [additional references](#)
- [Code of Student Conduct](#)
- [Grades and Grade Point Average](#)
- [Credit-Only Courses](#)
- [Audits](#)

## Non-Discrimination Policy

NC State provides equal opportunity and affirmative action efforts, and prohibits all forms of unlawful discrimination, harassment, and retaliation ("Prohibited Conduct") that are based upon a person's race, color, religion, sex (including pregnancy), national origin, age (40 or older), disability, gender identity, genetic information, sexual orientation, or veteran status (individually

and collectively, "Protected Status"). Additional information as to each Protected Status is included in NCSU [REG 04.25.02](#) (Discrimination, Harassment and Retaliation Complaint Procedure). NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at [POL 04.25.05](#) or <https://oied.ncsu.edu/divweb/>. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

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## Student Resources

Academic and Student Affairs maintains a website with links for student support on campus, including academic support, community support, health and wellness, financial hardship or insecurity, and more. [Find Help on Campus](#).

## Disability Resources

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the [Disability Resource Office \(DRO\)](#) at Holmes Hall, Suite 304, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the [Policies, Rules and Regulations page](#) maintained by the DRO and [REG 02.20.01 Academic Accommodations for Students with Disabilities](#).

## Safe at NC State

At NC State, we take the health and safety of students, faculty and staff seriously. The Office of Equal Opportunity supports the university community by providing services and resources to support and guide individuals in obtaining the help they need. See the [Safe at NC State webpage](#) for resources.

## Supporting Fellow Students in Distress

As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another and to ensure that this classroom and the campus as a whole remain a healthy and safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you, either for the classmate's well-being or yours. If you feel this way, I would encourage you to report this behavior to the [NC State CARES website](#). Although you can report anonymously, it is preferred that you share your contact information so they can follow up with you personally.

## Basic Needs Security

Any student who faces challenges securing their food or housing or has other severe adverse experiences and believes this may affect their performance in the course is encouraged to notify the professor if you are comfortable in doing so. Alternatively, you can contact the Division of Academic and Student Affairs to learn more about the [Pack Essentials program](#).

## Health and Well-Being Resources

Everyone is encouraged to take care of themselves and their peers. If you need additional support, there are many resources on campus to help you:

- [Counseling Center](#)
  - [Health Center](#)
  - If the personal behavior of a classmate concerns or worries you, either for the classmate's well-being or yours, we encourage you to report this behavior to the [NC State CARES team](#)
  - If you or someone you know are experiencing food, housing or financial insecurity, please see the [Pack Essentials Program](#)
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## Course Evaluations

ClassEval is the end-of-semester survey for students to evaluate the instruction of all university classes. The current survey is administered online and includes 12 closed-ended questions and 3 open-ended questions. Deans, department heads, and instructors may add a limited number of their own questions to these 15 common-core questions.

Each semester students' responses are compiled into a ClassEval report for every instructor and class. Instructors use the evaluations to improve instruction and include them in their promotion and tenure dossiers, while department heads use them in annual reviews. The reports are included in instructors' personnel files and are considered confidential.

Online class evaluations will be available for students to complete during the last two weeks of the semester for full semester courses and the last week of shorter sessions. Students will receive an email directing them to a website to complete class evaluations. These become unavailable at 8am on the first day of finals.

- Contact ClassEval Help Desk: [classeval@ncsu.edu](mailto:classeval@ncsu.edu)
- [ClassEval website](#)

- [More information about ClassEval](#)
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## **Syllabus Modification Statement**

Our syllabus represents a flexible agreement. It outlines the topics we will cover and the order we will cover them in. Dates for assignments represent the earliest possible time they would be due. The pace of the class depends on student mastery and interests. Thus minor changes in the syllabus can occur if we need to slow down or speed up the pace of instruction. In general, when I make changes I do so with the aim of benefiting students.

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*Last updated: 2026-01-13*