

CSCE 496/896, MOBILE AND WIRELESS SECURITY

Fall 2019

Instructor:	Nirnimesh Ghose	Time:	T Th 9:30 AM – 10:45 AM
Email:	ngghose@unl.edu	Place:	101 Louise Pound Hall .
Office Hours:	T 11:00 AM – 12:00 PM, or by appt.		

Course Pages:

1. Canvas – Quizzes and project details.
2. <https://cse.unl.edu/~ngghose/csce496896.php> – Reading materials.

Course description: The research seminar covers fundamental work and current topics of interest in wireless and mobile security. The course is intended for students who are interested in doing research or pursuing a career related to cybersecurity. At the end of this course, students will have a broad knowledge of the state-of-the-art and open problems in wireless and mobile security, thus enhancing their potential to do research or pursue a career in this rapidly developing area. This course is structured as a combination of lectures and research seminars, where each topic will be introduced as lectures and research papers will be presented by students or the instructor. The current main topics of interests include wireless security (secret free trust-establishment, secret free key establishment, and evolution, secret free confidentiality, denial-of-service, MAC layer misbehavior), and mobile security (embedded security, malware threats, intrusion detection, device fingerprint, device compromise, autonomous vehicle/aircraft security).

Required Material: For each paper being covered on a given day, each student (whether presenting or not), should bring to class a copy of the paper (hard copy or on a computer). Also, bring several questions and critiques for discussion contribution.

Prerequisites: An undergraduate-level understanding of probability, statistics, graph theory, algorithms, and linear algebra is assumed.

Attendance Policy: As a seminar-style course, participation is 10% of the grade so it is important to miss as few classes as possible. Students are expected to have several serious critiques of the paper prepared for each class. Make-ups for assignments and projects will be given only under circumstances beyond student's control (a university-sanctioned excuse). Unless circumstances are particularly extreme, it is expected that an absentee presenter shall find a suitable replacement (trade time slots). Prior arrangements with the instructor must be made when feasible and official verification of circumstances necessitating the absence will be required. Note that late arrivals are incredibly distracting, and as such anyone, more than 10 minutes late will receive a 0 for attendance that day.

Stay Up-to-Date: It is CSE Department policy that students in CSE courses regularly (every 24 hours) check their email so that they do not miss important course announcements.

Also, utilize the student resource center at Avery 12, more details available at <http://cse.unl.edu/src>.

Course Outline:

Overview of course and syllabus	1 day (week 1)
Basics of cryptography and security	2 days (weeks 1 and 2)
Project ideas presentations	1 day (week 2)
Wireless Security – Context based key extraction and evolution	2 days (week 3)
Wireless Security – Secret free confidentiality	2 days (week 4)
Wireless Security – Secret free trust-establishment	2 days (week 5)
Mobile Security – Hardware/embedded security	2 days (week 6)
Mobile Security – Device fingerprint (hardware/channel)	2 days (week 7)
Wireless Security – MAC layer misbehaviour	2 days (week 8)
Wireless Security – Denial-of-service/Jamming attacks	2 days (weeks 9 and 10)
Mobile Security – Malware threats/Intrusion detection	2 days (weeks 10 and 11)
Mobile Security – Device compromise	2 days (weeks 11 and 12)
Mobile Security – VANET/Aircraft communication security	2 days (weeks 12 and 13)
Wireless Security – 5G LTE security	2 days (weeks 13 and 14)

Course Objectives:

- Understand and articulate the meaning of security properties (such as secrecy, privacy, authentication, integrity, etc.) in context of wireless and/or mobile security.
- Identify hard open-problems in the area, and understand why they are hard.
- Explain the research methods employed by a paper and why they were appropriate (or not).
- Propose novel research idea within areas of wireless and/or mobile security.
- Give one or more technical talk(s).
- Write a high-quality review of wireless and/or mobile security conference/journal papers.

Homework: Quizzes and/or paper summaries will be due for each class meeting. Undergraduates will be responsible for quizzes per class meeting. Graduate students will be responsible for a quiz and a full paper summary per paper assigned.

Each student will present a minimum of two papers throughout the eleven modules (the first 2 weeks composing Module 1). Additional presentations will be added as necessary.

Literature Review Project: Each student will complete a literature review on an area of wireless or mobile security of their choice. A tentative list of topics will be provided on the course website. This review will establish the related work for their final project. Undergraduate students should have a minimum of 5 papers in their literature review and graduate students should have a minimum of 10 papers. This might mean needing to identify far more papers that seem to be of interest and carefully pruning to those of greatest interest.

The literature review assignment will consist of three deliverable:

- **Annotated Bibliography:** A complete BibTex library should be submitted, including: PDFs of papers, a complete citation entry for each paper, and a summary for each paper (with the paper content in the Notes section and the critique in the Research Notes section).
- **Draft Literature Review:** A draft of your literature review showing progress on tying the papers together and understanding open research questions.

- Final Literature Review: The final draft to be graded for completeness.

The early deliverable allow you to gain feedback from the instructor (and possibly your coursemates).

Final Proposal: Each student will produce a short research proposal on an open research topic in Wireless and/ or Mobile Security, and how they would approach an exploration of this topic.

The proposal assignment will consist of three deliverable:

- Ideas Presentation: This presentation will allow you to solicit feedback from your coursemates on the topic of your choosing early in the process of your literature review. You will have a time slot to present the idea you have chosen to explore for both the literature review, and later proposal.
- Draft Proposal: A draft of your proposal, incorporating your ideas from your literature review to address an open research question.
- Final Proposal: The final draft to be graded for completeness.

The early deliverable allow you to gain feedback from the instructor (and possibly your coursemates).

496 versus 896: The differences in workload between undergraduate and graduate students will be:

- Homework: Undergraduates will be responsible for one quiz per paper assigned. Graduate students will be responsible for a full paper summary in addition to the quiz.
- Literature Review: Undergraduates will have a minimum of 5 papers in their literature review. Graduate students will have a minimum of 10 papers.

All students will be responsible for reading all assigned papers, bringing appropriate notes to class, and participating in class discussions.

Grading Policy:

Presentation	20%
Quizzes & Paper Summary	20%
Lit Review Project	25%
Final Proposal	25%
Class participation	10%

Grading:

A+	97 - 100.0
A	93 - 96.99
A-	90 - 92.99
B+	87 - 89.99
B	83 - 86.99
B-	80 - 82.99
C+	77 - 79.99
C	73 - 76.99
C-	70 - 72.99
D+	67 - 69.99
D	63 - 66.99
D-	60 - 62.99
F	00 - 59.99

Important Dates:

Project Ideas Presentations	September 05, 2019
Work on Literature Review Project (outside class) ..	September 06 – October 30, 2019
Project Due	October 31, 2019
Work on Final Proposal (outside class)	November 01 – December 02, 2019
Final Presentations	December 03 – 12, 2019
Final Project Due	December 13, 2019

Academic Honesty: All homework assignments, quizzes, exams, etc. must be your own work. No direct collaboration with fellow students, past or current, is allowed unless otherwise stated. The Computer Science & Engineering department has an Academic Integrity Policy (<http://cse.unl.edu/academic-integrity-policy>). All students enrolled in any computer science course are bound by this policy. You are expected to read, understand, and follow this policy. Violations will be dealt with on a case by case basis and may result in a failing assignment or a failing grade for the course itself.

Special Policies: Late work will not be accepted unless arrangements are made with the instructor prior to the due date.

Students with Disabilities: The University strives to make all learning experiences as accessible as possible. If you anticipate or experience barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can discuss options privately. To establish reasonable accommodations, I may request that you register with Services for Students with Disabilities (SSD). If you are eligible for services and register with their office, make arrangements with me as soon as possible to discuss your accommodations so they can be implemented in a timely manner. SSD contact information: 232 Canfield Admin. Bldg.; 402-472-3787.

Counseling and Psychological Services: UNL offers a variety of options to students to aid them in dealing with stress and adversity. [Counseling and Psychological & Services \(CAPS\)](#); is a multidisciplinary team of psychologists and counselors that works collaboratively with Nebraska students to help them explore their feelings and thoughts and learn helpful ways to improve their mental, psychological and emotional well-being when issues arise. CAPS can be reached by calling 402-472-7450. [Big Red Resilience & Well-Being \(BRRWB\)](#) provides one-on-one well-being coaching to any student who wants to enhance their well-being. Trained well-being coaches help students create and be grateful for positive experiences, practice resilience and self-compassion, and find support as they need it. BRRWB can be reached by calling 402-472-8770.

Concerns: The CSE Department has an anonymous contact form (<http://cse.unl.edu/contact-form>) that you may use to voice your concerns about any problems in the course or department if you do not wish to be identified.