

Secure Coding (CNT 4419)

CRN 15528, Section 001, 3 Credit Hours

Course Prerequisite: Data Structures (COP 4530)

College of Engineering, Department of Computer Science and Engineering

COURSE SYLLABUS

Instructor Name:	Jay Ligatti (ligatti@usf.edu)	Semester/Term & Year:	Spring 2025
Office Hours:	MW 2:30-3:25pm & 6:25-7pm in ENB 333	Class Meeting Times:	MW 3:30-4:45pm
Course webpage:	www.cse.usf.edu/~ligatti/sc/25/	Class Location:	CHE 103
Teaching Assistants:	Parisa Momeni (parisamomeni@usf.edu) Gabriel Laverghetta (glaverghetta@usf.edu)	TA Office Hours:	Email for appointments

☞ Everything on this syllabus is subject to change as the semester progresses.

I. University Course Description

Principles and practices for secure computing and writing secure software, including software for performing information management and networking and communications.

II. Course Purpose

Software developers should be familiar with and understand the basic principles and practices for computing securely and writing secure software. This course covers these topics, including in the context of software for performing information management and networking and communications.

III. Course Objectives

Students having successfully completed this course will understand the basic principles and practices of secure computing and writing secure software, including: security threats, secure software design, authentication, authorization, access control, buffer-overflow attacks, type safety, layered networking architectures, basic network protocols, firewalls, intrusion-detection systems, web applications, databases and information management, SQL queries, SQL injection attacks and defenses, XSS, symmetric cryptography, asymmetric cryptography, and password management.

IV. Student Learning Outcomes

Students will demonstrate the ability to:

1. explain the basic principles and practices of secure computing and writing secure software;
2. analyze, evaluate, and explain security vulnerabilities (including buffer overflows, SQL injections, and XSS) in software designs and implementations;
3. synthesize alternative designs and implementations that incorporate mitigations for observed vulnerabilities; and
4. apply knowledge of information management and computer networking and communications while performing software-security assessments and designing and implementing secure code.

V. Required Textbook

- Foundations of Security. Neil Daswani, Christoph Kern, and Anita Kesavan. Apress, 2007 (1st ed). ISBN-10: 1590597842; ISBN-13: 978-1590597842.

This book is accessible online from machines on the USF network:

<https://link.springer.com/book/10.1007/978-1-4302-0377-3>

VI. Supplementary Required Readings

- Additional required online readings, if any, will be linked from the course webpage.

VII. Basis for Final Grade

There will be 13 quizzes, 4 assignments, and 1 final exam. The 2 lowest quiz scores will be dropped, so final grades are determined by the 11 highest quiz scores (each worth 5.5% of the final grade), the 4 assignment scores (each worth 2.5% of the final grade), and the final exam score (worth 29.5% of the final grade). All the quizzes and exam are cumulative; earlier material may appear on any quiz or exam.

The scale for final letter grades is as follows, using standard notation for ranges: A ($\infty, 93.3$], A- (93.3, 90], B+ (90, 86.7], B (86.7, 83.3], B- (83.3, 80], C+ (80, 76.7], C (76.7, 73.3], C- (73.3, 70], D+ (70, 66.7], D (66.7, 63.3], D- (63.3, 60], and F (60, $-\infty$). A+ grades may be awarded for exceptionally outstanding work.

Attendance: Attendance on non-quiz, non-exam days does not directly affect final grades, but any absence may indirectly affect your final grade by putting you at risk of missing assignments, schedule updates, or material not covered in the textbook.

VIII. Grade Dissemination

Grades will be posted on Canvas.

IX. Course Policies: Grades

Late Work Policy: No credit will be given for work turned in late.

There are no make-ups or extensions for quizzes, assignments, or final exam. Do not email course staff requesting a make-up or extension.

Your 2 lowest quiz scores are automatically dropped, allowing you to miss any 2 quizzes without penalty, for example due to illness, work or family obligations, necessary travel, or any emergency.

Because your 2 lowest quiz scores will be dropped automatically, do not email or otherwise notify course staff as to why, or even that, you're missing a quiz.

Essay Policy: The quizzes and final exam may include one or more short-answer or essay questions. Respond in complete sentences. Avoid extraneous details in your responses. Also avoid using bulleted/enumerated lists in your responses. Responses will be graded based on readability, correctness, and thoroughness.

(Non-)Group Work Policy: Everything you turn in for this course—assignments, quizzes, and final exam—must be your own, individual work. **All quizzes and final exam in this course are closed books, notes, phones, computers, AI assistants, smart glasses, smart watches, friends, classmates, etc.** You must complete the quizzes and final exam using only your own knowledge and skills, and a writing instrument (pencil or pen).

Final Examinations Policy: All final exams are to be scheduled in accordance with the University's final examination policy.

X. For Students with Accessibility Memoranda

Please email the instructor to arrange accommodations. Do not schedule any quizzes or the final exam with Student Accessibility Services. This course has its own separate, reduced-distraction site (tentatively, room ENB 328) for taking quizzes and the final exam. One of the Teaching Assistants will proctor quizzes and the final exam in this separate site, at approximately the same times that the quizzes and final exam are being proctored in the main site (i.e., room CHE 103).

XI. Course Policies: Technology and Media

Email: For questions you'd like answered outside of class related to the course readings, material, assignments, schedule, or grading, please first email the teaching assistants. If you have done so but are not satisfied with the response, please email the instructor. Allow at least 48 hours for a response.

Canvas: We will use Canvas to post grades and email any urgent announcements. The course schedule and assigned readings are posted on the course webpage (www.cse.usf.edu/~ligatti/sc/25).

XII. Course Policies: Student Expectations

Academic honesty: Everything you turn in for this course must be your own work. Students caught violating academic integrity, for example by using notes or a phone during a quiz or copying another's student's solution, will receive an FF grade for the course.

Do not post your assignment solutions on any medium that could be accessed by other current or future Secure Coding students (e.g., in a public GitHub repository), as doing so may make you an accessory to another student's plagiarism.

XIII. USF Core Syllabus Policies

Additional USF policies (e.g., regarding academic integrity) may be accessed at: <https://www.usf.edu/provost/faculty/core-syllabus-policy-statements.aspx>

XIV. Tentative Schedule—subject to adjustment as the semester progresses—see the course webpage

<u>Week</u>	<u>Topics</u>
1	Introduction; Definitions (policy, mechanism, enforcement, property)
2	Definitions (safety, liveness, and CIA properties)
3	Unenforceability
4	Threats
5	Tradeoffs; Secure design; Access control; Authentication; Authorization
6	Memory segmentation; Buffer overflows
7	StackGuard; ASLR; CFI; Type safety
8	Format string attacks; Integer overflow attacks
9	Networking and communications; TCP/IP and OSI layered architectures; Protocols; DoS
10	Firewalls; IDSs; Web applications; Client-state manipulation
11	Databases; Information management; SQL queries
12	SQL injection attacks
13	Code injections; XSS
14	XSS; Symmetric cryptography
15	Asymmetric cryptography; Diffie-Hellman; RSA; Signatures; MACs; Password management
Final	Exam (Wednesday, May 7, at 12:30-2:30pm)

This schedule is subject to adjustment as the semester progresses.

The 13 quizzes are tentatively scheduled to be held during the final 20 minutes of every Wednesday class meeting, except during Weeks 1 and 15. Quizzes will only cover material from previous class meetings; for example, the quiz on 1/22 will not require knowledge of the material we cover in class on 1/22.