CSCI 5322 – DEFENSIVE CODING AND SECURITY

CREDIT HOURS: 3
PREREQUISITES: Admittance into graduation program in Cyber Security
RECOMMENDED PREREQUISITE COURES:
CSCI 3302 Data Structures or 3331 Objected Oriented Programming, CSIT 4355 Enterprise Security or CSCI 4347 Cyber Security Concepts and Practices

CATALOG DESCRIPTION

Provides a foundation for building secure software by applying security principles to the software development lifecycle. Topics covered include: security in requirements engineering, secure designs, risk analysis, threat modeling, deploying cryptographic algorithms, defensive coding, penetration testing, fuzzing, static analysis, and security assessment. Includes case studies, data protection via coding and secure access methodology, and vulnerability identification, and modern security coding techniques.

PURPOSE OF COURSE

To study and practice fundamental techniques in developing secure coding practices, along with identifying and mitigating security risks in code. To discuss security concerns vs. design tradeoffs at various levels of coding abstraction. Learn the practical skills for developing and testing for secure software while also learning sound security fundamentals from real-world case studies.

EDUCATIONAL OBJECTIVES

Upon successful completion of the course, students should be able to:

1. Apply contemporary formal mathematical modeling techniques to model and analyze the security of a software system
2. Identify project security risks and selecting risk management strategies.
3. Use statistical methods to collect and analyze metrics for assessing and improving the security of a product, process, and project objectives.
4. Describe and discuss security concerns and designs at multiple levels of abstraction.
5. Demonstrate how to comply with data privacy and security requirements when designing a software system.
6. Design a software solution with secure access and protection of data.
7. Use quality assurance activities and strategies that support early vulnerability detection and contribute to improving the development process.
8. Develop secure coding techniques.

COURSE CALENDAR

This course meets for a minimum of 37.5 lecture contact hours during the semester. Students have significant assignments based on readings from the primary literature, participate in classroom discussions regarding current research topics, complete periodic homework and laboratory/programming assignments, and periodic exams in addition to the final exam. Students are expected to prepare for any class assignments or quizzes over the material covered in class or in the reading material. Successful completion of these activities requires at a minimum six additional hours of outside of classroom work each week.

CONTENT **Hours**

Introduction to Defensive Coding and Security.....3
- Overview and course introduction
- Coding Lifecycles

Misuse, Ignorance and Abuse of Coding.....12
- Case studies
- Violating good coding practices
- Threat modeling
- Test planning

Coding.....9
- Defensive Coding
- Case Studies
- Code reviews and inspection

Cryptography.....9
- Theory of cryptography
- Cryptography in practice
- Methods used to subvert cryptography

Miscellaneous Threats.....6
- Distribution and deployment of code
- Insider threats
- CVSS
- Usability

Exams (plus final).....6

TOTAL 45

REFERENCES

William Arthur Conklin, CSSLP Certification All-in-One Exam Guide, McGraw Hill, 2014 [Certified Secure Software Lifecycle Professional]

Gary McGraw, Software Security: Building Security In. Addison-Wesley, 2006

Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, and Nancy Mead. Software Security Engineering: A Guide for Project Managers Addison-Wesley, 2008

Attendance Policy:
Attendance will be taken at the beginning of each class. If you have 3 unexcused absences, then your final grade will be reduced by one letter grade. If you have 4 unexcused absences, you will receive an "F" in the course. To receive an excused absence a written and signed notice is required within three class days of the absence. If you miss class without approval of your instructor, you will receive a grade of zero on the missed assignment. Authorized absences must be approved by your instructor in advance of the absence unless you have an emergency or illness. Make-up work must be completed outside of normal class hours and within one week following an excused absence. It is your responsibility to see your instructor and make arrangements for make-up work.

Academic Integrity (*A-9.1*)
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

Withheld Grades - *Semester Grades Policy (A-54)*
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

Mental Health Statement

SFASU values students' mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students' mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:

SFASU Counseling Services
www.sfasu.edu/counselingservices
3rd Floor Rusk Building
936-468-2401

SFASU Human Services Counseling Clinic
www.sfasu.edu/humanservices/139.asp
Human Services Room 202
936-468-1041

Crisis Resources:
Burke 24-hour crisis line 1(800) 392-8343
Suicide Prevention Lifeline 1(800) 273-TALK (8255)
Crisis Text Line: Text HELLO to 741-741