

SYLLABUS FOR CYB-5500

Software And Applications Security

COURSE DESCRIPTION

This course covers the foundations of software and applications security. It provides exposure to key programming and software development processes, emphasizing the risks associated with insecure software. Fundamental coding concepts, principles, and techniques that make software more secure and resilient are explored. The course analyzes software vulnerabilities and attacks such as buffer overflows, SQL (Structured Query Language) injection, and session hijacking. It also demonstrates appropriate prevention and mitigation methods, including advanced testing and program analysis techniques.

COURSE TOPICS

- Building security in
- Security design considerations
- Defensive programming and code analysis
- Penetration testing and DevSecOps
- Metrics and models for AppSec maturity
- Emerging frontiers for AppSec

COURSE OBJECTIVES

After completing this course, you should be able to:

- CO 1** Assess ways to build security in during software development.
- CO 2** Evaluate elements in software secure design.
- CO 3** Apply defensive programming and code analysis.
- CO 4** Evaluate penetration testing and DevSecOps.
- CO 5** Examine metrics and models for the maturity of application security.
- CO 6** Analyze emerging frontiers in application security.

COURSE MATERIALS

You will need the following materials to complete your coursework. Some course materials may be free, open source, or available from other providers. You can access free or open-source materials by clicking the links provided below or in the module details documents. To purchase course materials, please visit the [University's textbook supplier](#).

Required Textbook(s)

- Merkow, S. M. (2020). *Secure, resilient, and agile software development*. CRC Press/Auerbach. ISBN-13: 978-0367332594

COURSE STRUCTURE

Software and Applications Security is a three-credit, online course consisting of **six** modules. Students complete readings, participate in discussions, and complete written assignments on course topics. Students also submit a final project. Modules include an overview, topics, learning objectives, study materials, and activities. Module titles are listed below.

- **Module 1: Software Development: Building Security In**
Course objectives covered in this module: CO 1
- **Module 2: Secure Design Considerations During Application Development**
Course objectives covered in this module: CO 2
- **Module 3: Defensive Programming and Static Code Analysis**
Course objectives covered in this module: CO 3
- **Module 4: Penetration Testing, Dynamic Analysis, and Securing DevOps**
Course objectives covered in this module: CO 4
- **Module 5: Measurement and Metrics Models**
Course objectives covered in this module: CO 5
- **Module 6: Application Security Trends and Frontiers**
Course objectives covered in this module: CO 6

ASSESSMENT METHODS

For your formal work in the course, you are required to participate in online discussion forums, complete written assignments and application papers, and complete a final project. See below for details.

Consult the Course Calendar for due dates.

Promoting Originality—One or more of your course activities may utilize a tool designed to promote original work and evaluate your submissions for plagiarism. More information about this tool is available in [this document](#).



Discussion Forums

In addition to an ungraded About Me Forum, you are required to participate in **six** graded online class discussions.

Communication with your mentor and among fellow students is a critical component of online learning. Participation in online class discussions involves two distinct activities: an initial response to a discussion question and at least two subsequent comments on classmates' responses.

All of these responses must be substantial. Meaningful participation is relevant to the content, adds value, and advances the discussion. Comments such as "I agree" and "ditto" are not considered value-adding participation. Therefore, when you agree or disagree with a classmate or your mentor, state and support your position.

You will be evaluated on the quality and quantity of your participation, including your use of relevant course information to support your point of view, and your awareness of and responses to the postings of your classmates. Remember, these are discussions: responses and comments should be properly proofread and edited, mature, and respectful.



Written Assignments

You are required to complete **six** written assignments. The written assignments allow you to synthesize module concepts by speculating about, comparing/contrasting, and analyzing concepts. You will write a paper for each assignment.



Final Project

You will work on your final project as part of a team with a classmate. Together you will design a secure e-commerce boutique, following all software development life cycle (SDLC) phases and best practices

from requirements (functional and nonfunctional) to testing and threat modeling, deployment, and post-production stages.

You will describe your process in a report of 3000 to 4000 words (12 to 15 pages double spaced, not including the cover sheet and references). Each member of your team will submit a report separately.

Teams will be formed by your mentor and you can begin working on the final project as soon as your team is formed. You may collaborate on this assignment in several possible ways. Options are explained in the final project document and include using Edison Live, Moodle messaging, or another method of your choice, such email.

Note: If the course enrollment is not suitable for teams, your mentor will assign this as an individual project.

Course Reflection

For this course—and throughout the Master of Science in Cybersecurity (MSCYB) program—you will complete a course reflection, which includes collecting digital artifacts, participating in course reflection discussion forums, and writing a course reflection essay. Reference the Course Reflection section of the course website for full requirements and instructions.

Consult the Course Calendar for due dates.

GRADING AND EVALUATION

Your grade in the course will be determined as follows:

- **Online discussions (6)**—15%
- **Written assignments (6)**—45%
- **Final project**—25%
- **Course Reflection**—15%
 - **Course Reflection discussions (2)**—5%
 - **Course Reflection essay**—10%

All activities will receive a numerical grade of 0–100. You will receive a score of 0 for any work not submitted. Your final grade in the course will be a letter grade. Letter grade equivalents for numerical grades are as follows:

A	= 93–100	B	= 83–87
A–	= 90–92	C	= 73–82
B+	= 88–89	F	= Below 73

To receive credit for the course, you must earn a letter grade of C or higher on the weighted average of all

assigned course work (e.g., assignments, discussion postings, projects). Graduate students must maintain a B average overall to remain in good academic standing.

STRATEGIES FOR SUCCESS

First Steps to Success

To succeed in this course, take the following first steps:

- Read carefully the entire Syllabus, making sure that all aspects of the course are clear to you and that you have all the materials required for the course.
- Take time to read the entire Online Student Handbook. The Handbook answers many questions about how to proceed through the course, and how to get the most from your educational experience at Thomas Edison State University.
- Familiarize yourself with the learning management systems environment—how to navigate it and what the various course areas contain. If you know what to expect as you navigate the course, you can better pace yourself and complete the work on time.
- If you are not familiar with web-based learning, be sure to review the processes for posting responses online and submitting assignments before class begins.

Study Tips

Consider the following study tips for success:

- To stay on track throughout the course, begin each week by consulting the Course Calendar. The Course Calendar provides an overview of the course and indicates due dates for submitting assignments, posting discussions, and submitting the final project.
- Check Announcements regularly for new course information.

Using AI Ethically: A Guide for TESU Students

TESU's [Academic Code of Conduct](#) permits student AI use in support of their writing and research process—not as a replacement for original writing. Document AI use with an acknowledgment statement at the end of each assignment, noting the tools and prompts used. Cite any AI-generated content on the References page. Please review [Using AI Ethically: A Guide for TESU Students](#) for more detailed information.

COMMITMENT TO DIVERSITY, EQUITY, AND INCLUSION

Thomas Edison State University recognizes, values, and relies upon the diversity of our community. We strive to provide equitable, inclusive learning experiences that embrace our students' backgrounds, identities, experiences, abilities, and expertise.

ACCESSIBILITY AND ACCOMMODATIONS

Thomas Edison State University adheres to the Americans with Disabilities Act (ADA, 1990; ADAAA, 2008) and Section 504 of the Rehabilitation Act of 1973. The Office of Student Accessibility Services (OSAS) oversees requests for academic accommodations related to disabilities; a student who is pregnant, postpartum, or a student parenting a newborn who is not the birth parent [as covered under NJSA18A]; and students requesting academic accommodation for a short-term/temporary illness and/or injury. Information can be found on the [Office of Student Accessibility Services](#) webpage and questions can be sent to ADA@tesu.edu.

ACADEMIC POLICIES

To ensure success in all your academic endeavors and coursework at Thomas Edison State University, familiarize yourself with all administrative and academic policies including those related to academic integrity, course late submissions, course extensions, and grading policies.

For more, see:

- [University-wide policies](#)
- [Undergraduate academic policies](#)
- [Undergraduate course policies](#)
- [Graduate academic policies](#)
- [Graduate course policies](#)
- [Nursing student policies](#)
- [Nursing graduate student policies](#)
- [International student policies](#)
- [Academic code of conduct](#)