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Date:

CSX4224 Secure Software Systems

L-T-P-Cr: 2-0-2-3

Pre-requisites: Undergraduate Level of Computer Networks course

Learning Objectives:

1. To explore the foundations of software security
2. To apply contemporary formal mathematical modelling techniques to model and analyse the security of a software system.
3. To understand techniques at each phase of the development cycle that can be used to strengthen the security of software systems.

Course Outcomes:

At the end of the course, a student should be able to:

S. No	Course Outcome	Mapping to POs
1	Reason about and apply general principles of secure software system design, implementation, and analysis	PO1
2	Identify common attacks and the vulnerabilities that enable them	PO2, PO5
3	Assess the merits and limitations of existing and proposed software defenses	PO2, PO5
4	Find and fix vulnerabilities in software	PO2, PO5

Syllabus:

UNIT I: Lectres: 8

Introduction to secure software system, Buffer overflow; Requirements: abuse & misuse cases, security requirements; Planning: risk assessment, Protection Poker OS command injection & Hardcoded credentials.

UNIT I: Lectres: 6

Design: secure design patterns, test planning, Design: architectural risk & threat modelling; Implementation: defensive coding practices, Web applications, Cross-Site Request Forgery, Code Inspections, File system permissions.

UNIT III: Lectres: 6

Cryptography: authentication, public-key, symmetric key, SSH Activity, Hashing salt.

UNIT IV: Lectres: 8

Deployment & Distribution: patching, security managers, Java security manager Java reflection, Black box testing.

UNIT V: Lectres: 8

Low level security: Memory layout, code injection, other memory exploits, format string vulnerabilities.

Textbook:

1. Gary McGraw, —Software Security: Building Security, Addison-Wesley, ISBN 978-321-35670-3, 2006.
2. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, and Nancy Mead. Addison-Wesley, —Software Security Engineering: A Guide for Project Managers, ISBN 978-0-32-150917-8, 2008.
3. Charles P. Pfleeger and Shari Lawrence Pfleeger, —Analysing Computer Security, Prentice Hall, Upper Saddle River, NJ, 2011. ISBN 978-0-13-278946-2.