

COURSE FOR SPRING 2011

CNT4403 (CIS4363) Introduction to Data and Network Security

Note: This course counts as elective for CS and CE undergraduates and for grad students who have not exceeded their 4000 courses. It is also geared to BIET students

Both intelligence and law enforcement agencies have uncovered evidence of penetrations of government and commercial organizations resulting in loss of highly sensitive national defense and business information. The result is a massive shift in demand for security people away from those who can write reports to those who can find the flaws, see the attacks, and secure the networks.

Security is a fundamental issue in current systems and there is a strong demand for software engineers who can develop secure software and maintain secure systems. This course exposes the required concepts and points the directions for further specialization. We use security patterns and UML models to describe designs. The course is updated yearly to reflect the latest advances in this topic. Its orientation is strongly practical with emphasis on systems development and maintenance. It is also appropriate for graduate students.

This course will be taught by Dr. Ed Fernandez. He developed the course, is the author of three books on security and a world-recognized expert on software systems and software security (he spent two weeks in March and July in Tokyo by invitation from the Japanese Government to work on software security). His biography is attached at the end.

Catalog description: Prerequisite: general background on operating systems, architecture, and languages. Overview of technical aspects of data security with emphasis on the Internet. Attacks and defenses. The design of secure systems. Use of security patterns.

Textbook: E.B.Fernandez, E.Gudes, and M. Olivier, *The Design of Secure Systems*, under contract with Addison-Wesley. Draft version available as Blackboard notes

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Goals: Security problems in the combination of the Internet with Intranets. Need to protect all architectural levels. Understanding of how to coordinate hardware and software to provide protection against internal and external attacks.

Prerequisite by topic: General concepts of operating systems, computer systems architecture, and software development.

Objectives

Understanding of the security problems introduced in the combination of the Internet with Intranets.

Understanding of how all aspects of a computer system contribute to security.

Providing a perspective on how a variety of mechanisms should work together to defend a system

Developing ability to evaluate and compare diverse systems or mechanisms with respect to their security.

Basic understanding of the theoretical and conceptual aspects that are needed to build secure systems

Outline:

1. Introduction: Internet and Intranets-- Structure, growth, possibilities.
Threats : Viruses, worms, denial of service, attackers
The design of secure systems. Review of UML.
2. Policies and models for data security: Institution, legislation, privacy. Basic policies.
Security models : Access matrix, multilevel, mandatory, discretionary models. Role-Based Access Control
3. Operating systems security: Unix, Windows, and new approaches.
4. Cryptography: Symmetric and public key systems
5. Application and language security: Buffer overflow, Java security, components
6. Database security
7. Network Security: Firewalls, SSL, Kerberos, VPNs, Wireless systems
8. Distributed systems: Security in .NET and Sun ONE, WebSphere and other application servers. Security in XML and Web Services

Grading: Homework assignments 40%
Take-home Final exam/project, 60%

Dr. Eduardo B. Fernandez (Eduardo Fernandez-Buglioni) is a professor in the Department of Computer Science and Engineering at Florida Atlantic University in Boca Raton, Florida. He has published numerous papers on authorization models, object-oriented analysis and design, and security patterns. He has written four books on these subjects, the most recent being a book on security patterns. He has lectured all over the world at both academic and industrial meetings. He has created and taught several graduate and undergraduate courses and industrial tutorials. His current interests include security patterns and web services security and fault tolerance. He holds a MS degree in Electrical Engineering from Purdue University and a Ph.D. in Computer Science from

UCLA. He is a Senior Member of the IEEE, and a Member of ACM. He is an active consultant for industry, including assignments with IBM, Allied Signal, Motorola, Lucent, and others. More details can be found at <http://www.cse.fau.edu/~ed>