

**Department of Computer & Electrical Engineering
and Computer Science
Florida Atlantic University
Course Syllabus**

1. Course title/number, number of credit hours	
Foundations of Cybersecurity/ CNT4403	3
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: COP 4610	
3. Course logistics	
<i>Term:</i> TBA/ This course has a significant amount of design content. <i>Class location and time:</i> TBA	
4. Instructor contact information	
<i>Instructor's name</i>	Dr. Eduardo B. Fernandez, Professor of CSE
<i>Office address</i>	EE 417
<i>Office Hours</i>	
<i>Contact telephone number</i>	561-297-3466
<i>Email address</i>	fernande@fau.edu http://faculty.eng.fau.edu/fernande
5. TA contact information	
<i>TA's name</i>	None
<i>Office address</i>	
<i>Office Hours</i>	
<i>Contact telephone number</i>	
<i>Email address</i>	
6. Course description	
Overview of technical aspects of data and network security with emphasis on the Internet. Attacks and defenses. The design of secure systems.	
7. Course objectives/student learning outcomes/program outcomes	
<i>Course objectives</i>	<p>Understand the security problems introduced in the combination of the Internet with Intranets, mobile devices, cloud computing, and sensors.</p> <p>Understand how all aspects of a computer system contribute to security.</p> <p>Provide a perspective on how a variety of mechanisms should work together to defend a system</p> <p>Develop ability to evaluate and compare diverse systems or mechanisms with respect to their security.</p> <p>Understand the basic theoretical and conceptual aspects that are needed to build secure systems</p> <p>Get proficiency in the use of patterns to build and analyze secure systems</p>

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<i>Student learning outcomes & relationship to ABET 1-7 outcomes</i>	<p>1,2,4,7</p> <p>1. An Ability to identify, formulate, and solve complex computing/engineering problems by applying principles of computing, engineering, science, and mathematics. (Problem solving)</p> <p>2. An ability to apply the computing/engineering design process to produce solutions that meet a given set of computing/engineering requirements with consideration for public health and safety, and global cultural, social, environmental, economic, and other factors as appropriate to the discipline. (Design)</p> <p>4. An ability to recognize legal, ethical and professional responsibilities in computing/engineering situations and make informed judgments, which must consider the impact of computing/engineering solutions in global, economic, environmental, and societal contexts (Professional responsibilities)</p> <p>7. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge. (Lifelong Learning)</p>
8. Course evaluation method	
Home Work - 2 take home	30%
Final Examination - take home	70%
9. Course grading scale	
Grading Scale: Grades are based on relative performance. No curves or ranges.	
10. Policy on makeup tests, late work, and incompletes	
No makeups can be given for final exam but date can be extended with a justified cause. Assignments can be made up in special cases by arrangement with the instructor.	
<i>Incomplete grades</i> are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation or work-related situation, incomplete grades will not be given	
11. Special course requirements	
None	
12. Classroom etiquette policy	
N/A	
13. Attendance policy statement	
<p>Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance.</p> <p>Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities.</p>	

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<p>It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.</p>
<p>14. Disability policy statement</p>
<p>In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.</p>
<p>15. Counseling and Psychological Services (CAPS) Center</p>
<p>Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/</p>
<p>16. Code of Academic Integrity policy statement</p>
<p>Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001. If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.</p>
<p>17. Required texts/reading</p>
<p>To reduce costs for our students, we strongly encourage you to explore the adoption of open educational resources (OER), textbooks and other materials that are freely accessible. We also encourage you to clearly state in the syllabus if course materials are available on reserve in the Library.</p>
<p>E.B.Fernandez, "The design of secure systems" (notes available in Canvas) Set of about 1000 slides (to be posted in Canvas)</p>
<p>18. Supplementary/recommended readings</p>
<p>E. B. Fernandez, <i>Security patterns in practice - Designing secure architectures using software patterns</i>. Wiley Series on Software Design Patterns, Wiley 2013.</p>
<p>19. Course topical outline, including dates for exams/quizzes, papers, completion of reading</p>
<p>1. Introduction: Motivation and definitions. Internet and Intranet-- Structure, growth, possibilities. Environment for security. Effect of new technologies. Related subjects. The Internet and its threats. Vulnerabilities and threats: Viruses, worms, denial of service, attackers. Need for holistic security.</p> <p>2. Security policies and models: Institution, legislation, and privacy policies.</p>

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- Compliance policies. Security models: Access matrix, multilevel, mandatory, discretionary models. Role-Based Access Control. Patterns for models. **Assignment 1**
3. **Cryptography** : Symmetric ciphers, DES and AES. Public key systems, digital signatures, hashing, certificates.
 4. **Security in hardware and operating systems**: Effect of hardware on security. Process and memory protection (modes, rings). Virtualization. Vulnerabilities. Unix, Linux, Windows, iOS. Hardened operating systems. Authentication.
 5. **Application and language security** : Malicious software. Language problems, buffer overflow, Java security. Application/content firewalls. Components.
 6. **Database security**: Using views for authorization in relational databases.
. Authorization systems in Oracle and similar systems. SQL injection and other attacks.
NoSQL databases. Data intensive systems security. **Assignment 2.**
 7. **Network Security**: Attacks. Secure layers. SSL, Kerberos, VPNs, Firewalls. Intrusion Detection.
 8. **Wireless systems**, smart phones and tablets. Threats and defenses.
 9. **Distributed systems**: Web security, Cross-scripting attacks. Security in web services and cloud computing. IoT security. Blockchain.
 - 10 **Developing secure software and systems**: Secure system design methodology. Use of patterns. Formal methods, model checking. Code-based secure lifecycles. Evaluation of security. CPS security