Course Syllabus

Course No.	CS 646
Section	1J1
Title	Network Protocols Security
Course Website	Course related materials will be posted on NJIT's Canvas system
Prerequisite(s)	CS 656 or ECE 637: "Internet and Higher Layer Protocols"
Class Schedule	Face-to-Face Monday 6:00 pm -8:50 pm Location: HUD JC02 – Jersey City
Instructor	**Asad Raza** • Email : asad.raza@njit.edu
Instructor Office Hours	• Monday : 5:00 PM to 6:00 PM
Description	This course covers the security of network protocols currently used on the Internet. It seeks to familiarize students with common threats and network attacks along with providing an in-depth study of methods used to secure network communication. The course includes an applied component, which will help students gain practical experience in attacking and defending networked systems. Topics include authentication systems, secure communication at data link, network, transport and application layers, vulnerabilities of Internet protocols, domain name system and routing security, firewalls, intrusion detection, honeypots, wireless networks security, malware propagation and detection and web security.
Learning Outcomes:	After completing the course, students will be able to: • Identify the appropriate security primitives that should be used to achieve specific security goals for communication over insecure networks. • Analyze the security of the main mechanisms used on the Internet to secure communication between computer systems at

	various network layers, including physical, network, transport, and application layers. • Describe common attacks against wired and wireless network protocols using standard terminology, allowing them to communicate effectively with other security professionals. • Assess whether a given communication protocol achieves the desired security goals. • Design a new communication protocol that achieves one or more specific security goals. • Gain a deep understanding of attacks against web applications and of design principles for effective defenses. • Critically analyze a scientific article that focuses on the security of network protocols.
Topics	• Introduction (overview of ethics, network security issues, cryptographic algorithms and authentication techniques) • Layer 2/3 security • Authentication systems, Key establishment protocols, Kerberos • Secure communication at the data link and network layers (IPSEC and IKE) • Secure communication at the transport and application layers (SSL/TLS, email security, PGP) • Vulnerabilities of Internet protocols • Denial of service (DoS) attacks and defenses • Firewalls, IP spoofing prevention • Routing protocols security and router security • Domain name server (DNS) security • Traffic monitoring, Intrusion detection, Honeypots • Wireless networks security • Spam, Phishing, and Pharming • Malware propagation and containment, Botnets • Anonymity and privacy on the Web **Topics are subject to change or omission, depending on time.**

Text Book(s)	Due to the dynamic and evolving nature of the network security field, the course will feature a mixture of material based on the optional recommended textbook, on instructor notes and on scientific articles in order to reflect recent developments in this area. **1) OPTIONAL**: Network Security: Private Communication in a Public World (2nd edition) by C. Kaufman, R. Perlman, M. Speciner, Prentice Hall 2002 ISBN: 0130460192 **2) WEB MATERIAL AND HANDOUTS:** Additional material will be posted on the course's associated Canvas page.
Grading	2 Projects: 20% 1 Presentation: 10% 3 Assignments 10 % 3 Quiz: 10 % Midterm exam: 20% Final exam: 30% There will also be several opportunities to earn extra credit. **All the Exams and Quizzes are closed book.** **Academic Integrity**: Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: https://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf. Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or

	dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.
Modifications to Syllabus	The syllabus may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in class of any changes to the syllabus.