SYLLABUS

COURSE DESCRIPTION:
Advanced concepts and applications of network communication and security. Topics include: client-server communications, web services and applications, network systems discovery, advanced access control, trade-off between network usability and security, configuration and hardening recommendations and strategies, monitoring, intrusion detection, countermeasures, and incident response. Emphasis on developing, deploying, and maintaining a secure network communication infrastructure. Lecture and mandatory 90 minute lab session once per week. 3 credits.

PREREQUISITES: COMP 430 or Instructor's Approval. The student should be able to install and configure the following operating systems: Windows Server 2012, Windows 10, Ubuntu, and CentOS. The student should be able configure a Windows Server firewall and use common security tools like Nmap and Wireshark.

PROFESSOR: Daniel Ford
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Office Hours: MTWThF 12:15—1:00 PM, and by appointment.

CS LAB ADMINISTRATOR: Francisco Mora
Office: Renshaw 208 E-mail: fmora@linfield.edu

LECTURES: Renshaw 211
Section 1: MWF 11:00 – 11:50 PM

RECOMMENDED RESOURCES:
- The Tangled Web: A guide to Securing Modern Web Applications by Michael Zalewski (2012); 978-1-59327-388-0.
- Hacking: The Art of Exploitation by Jon Erickson (2nd Edition 2008); 978-1-59327-144-2.
- Hacking Exposed 7: Network Security Secrets and Solutions by Stuart McClure, Joel Scambray, and George Curtz (2012); 978-0-07-178029-2.
- Anti-Hacker Tool Kit by Mike Shema (4th Edition 2014); 978-0-07-180015-0.
- Security Engineering by Ross Anderson (2nd Edition April 2008); 978-0470068526.
- Security+ Guide to Network Security Fundamentals by Mark Ciampa (4th Edition 2012); 978-1-111-64012-2.
- Security+ Guide to Network Security Fundamentals Lab Manual by Dean Farwood (4th Edition 2012); 978-1-111-64013-2.
- Comp TIA Network+ Study Guide by Todd Lammle (2009); 978-0-470-42727-7.

COURSE OBJECTIVES:
This course fulfills suggested curriculum requirements of ACM, IEEE, and the Computer Science Accreditation Board for Computer Science departments. The course will provide the student with tools and techniques to:
- Design and implement a network.
- Design and implement a Windows domain.
- Communicate between clients and servers.
- Learn how everything works together: gain a broad, general map of the different parts of a network, its servers, applications, and their security vulnerabilities.
- Become more proficient at skills acquired in COMP 430.
- Perform penetration testing.
- Defend a network: hardening, monitoring, and attack countermeasures.

The purpose of the course is to provide the student with advanced network communication and security concepts, techniques, and strategies.

STUDENT LEARNING OUTCOMES:
Upon completion of the course, students should be able to:
- Describe underlying network communication mechanisms, e.g. TCP/IP networking protocols and Network Address Translation.

- Appreciate the difficulty of the distributed nature of network problems.
- Describe and configure the interrelated roles of network systems and services, e.g. firewall, router, domain controller, DHCP, DNS, web and mail servers.
- Create and configure a Virtual Local Area Network.
- Implement a client/server socket based application.
- Build, harden, and monitor a web server.
- Evaluate vulnerabilities of network communication systems and services and implement deterrence strategies, e.g. minimal attack surface, layered defense, principal of least privilege and isolation, weakest link,….
- Evaluate and use approved network security components.
- Describe network attack vectors and mechanisms and implement appropriate countermeasures.

Students will be required to a create journal/repository of important and relevant information, e.g. key concepts, how to guides, best practices, URL and human resources, …

GRADING:

- Exams ~50%
- Homework/Projects ~50%

MAKE UP QUIZZES AND EXAMS

Make-up quizzes and exams will not be granted without prior arrangement or for reasons stated in the college catalog.

ILLNESS/MEDICAL POLICY

In the unfortunate event that you must miss class you are encouraged to contact your workshop partners to find out what we worked on in class and to pick up any materials that were handed out. In general, homework extensions and make-up exams will be granted as needed on an individual basis.

DISABILITY SUPPORT

Students with disabilities are protected by the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. If you are a student with a disability and feel you may require academic accommodations contact Cheri White, Assistant Director of Learning Support Services (LSS), within the first two weeks of the semester to request accommodations. LSS is located in Walker 126 (503-883-2444). We also recommend students communicate with their faculty about their accommodations and any special needs an instructor should be aware of.

CLASS/GROUP PARTICIPATION:

Attendance is required. Computer science requires tolerance, individual contributions, teamwork and the ability to learn from others. For the academic endeavor to succeed, we must treat each other with civility, courtesy and respect. Every student will be expected to make pertinent and substantive contributions to every group they are a member of.

ACADEMIC CONDUCT

In this course we will adhere to the college policy on academic honesty, as published in the Linfield College Course Catalog. Please review this policy if you are not already familiar with it.

Plagiarism is lying in an attempt to get credit for someone else's work.

- Never include someone else's code in something you are turning in for credit.
- Obey the *30 second long-term memory rule*. We all get stuck now and again. If you get help on a homework problem don't copy and paste what they did. Instead take a minute to think about their code why it works or doesn't work and how you might improve on their idea before starting to write your own solution from scratch. If this solution doesn't work see if you can fix it on your own first, and then repeat this step as necessary.
- Do not use any code that you do not understand. The more complicated the code is and less you understand exactly how and why it does what it does, the more comments you need to include with your code to explain how it works.

In computer science you will earn credit by combining basic building blocks, e.g. the vocabulary of a specific language, common patterns, well known data structures, and algorithms, into expressions, segments of code, procedures, functions, and entire programs that solve a particular problem or accomplish a specific task. The basic building blocks are common knowledge and thus represent ideas that do not need to be cited. You are expected to

generate, evaluate, and illustrate your own ideas on how these building blocks can be put together to solve particular problems. The building block combinations that you submit for credit will illustrate a combination of ideas that is similar to the combinations used by others in some respects albeit unique in some other important ways.