Course Description:

This course offers an introduction to firewalls and virtual private networks (VPNs) for securing a network. Various network security-related issues are introduced and examined. Different types of firewalls for securing data in an organization are discussed, as well as how to construct, configure, and administer a firewall and the functionality of a firewall. Other firewall topics include the utility of firewalls in tackling security problems and the limitations of a firewall. Different types of VPNs for securing data in an organizational setup are discussed as well as the benefits and architecture of a VPN and how to implement a VPN.

Major Instructional Areas:

1. Network security risks, threats, and vulnerabilities
2. Firewall types, functions, uses, and deployment strategies
3. VPN types, functions, uses, and deployment strategies
4. Network-centric TCP/IP protocols and applications
5. Layered network security strategies
6. Secure network design
7. Best practices and strategies for network security and incident response

Course Objectives:

1. Explain the fundamental concepts of network security.
2. Describe the fundamental functions performed by firewalls.
3. Describe the foundational concepts of VPNs.
4. Recognize the impact that malicious exploits and attacks have on network security.
5. Describe network security implementation strategies and the roles each can play within the security life cycle.
7. Manage and monitor firewalls, and understand their limitations.
8. Assess firewall design strategies.
10. Appraise the firewall and other security options available for personal and small office/home office (SOHO) environments.
11. Appraise the elements of VPN implementation and management.
12. Describe common VPN technologies.
13. Follow the creation of an example firewall implementation.
14. Follow the creation of an example VPN implementation.
15. Evaluate available resources and trends in network security.
Administrative Information

Professor: Frank H. Katz
Days/Time: Course is fully online via Desire-2-Learn (D2L)
Classroom: Not applicable
Office/Phone: SC 210/344-3192
E-mail: Frank.katz@armstrong.edu; in order to consolidate e-mails, I prefer that you e-mail me via Desire-2-Learn (D2L) e-mail, but you may also contact me at this address if necessary
Personal website: http://infotech.armstrong.edu/katz/katz/katzhome.html
Office Hours: My formal posted office hours are: TTh 10:30am-noon; TTh 1pm to 3:30pm; F 10am to noon
Prerequisite: ITEC 3700

Please note that I do not post a text as required and then not use it – if I list it as required, you must have it.

<table>
<thead>
<tr>
<th>Buying Option</th>
<th>From ASU Bookstore AND also the same from shopjblearning.com site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical text, virtual lab access code</td>
<td>978-1-284-15968-4</td>
</tr>
<tr>
<td>E-book, virtual lab access code</td>
<td>978-1-284-14179-5</td>
</tr>
<tr>
<td>JUST virtual lab access code *</td>
<td>978-1-284-14163-4</td>
</tr>
</tbody>
</table>

*This is if you purchased the book used or from a 3rd party source

Software Requirements, Other Materials and Resources:

- A USB flash memory thumb drive (a drive as small as 1GB will suffice).
- Homework assignments will be submitted using D2L Assignment dropboxes. You will be provided information about how to use the system, your username, and password. Materials needed for the course will be provided in D2L.
- The virtual labs are now written in HTML5. No special software is required to access the labs. A link to the labs will be provided in D2L.
- Case studies that are not in the text may be assigned to the class. In that case, I will provide all relevant material to you.
- You are expected to possess or have access to the latest version of MS Word and MS PowerPoint. It might also be beneficial to possess or have access to MS Excel. I will not accept documents completed in Open Office or Google Docs.
- To draw computer network diagrams (for security-related work), you might benefit from possessing or having access to MS Visio, however, it is not required. Any such drawings done with Visio can be done in MS Word. MS Visio is available for free to our students from the Armstrong Microsoft Imagine site.
IMPORTANT DATES

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, August 14</td>
<td>Fall Semester begins</td>
</tr>
<tr>
<td>Monday, September 4</td>
<td>Labor Day Holiday, Armstrong is closed</td>
</tr>
<tr>
<td>Thursday and Friday, September 21 and 22</td>
<td>The two-day observance of the Jewish High Holiday of Rosh Hashanah. I will not be in the office, nor will I answer e-mails on these two days.</td>
</tr>
<tr>
<td>Wednesday, October 4</td>
<td>Mid-term of the semester, last day to withdraw without a WF</td>
</tr>
<tr>
<td>Tentative: Tuesday November 7 and Weds November 8</td>
<td>I have submitted a paper for publication at the 2017 International Conference on Cyber Conflict in Washington, DC. If my paper is accepted, I will be attending. If that happens, I will have Internet access, but reduced time to communicate with you.</td>
</tr>
<tr>
<td>Monday, November 20 – Friday November 24</td>
<td>Thanksgiving Break</td>
</tr>
<tr>
<td>Friday, December 1</td>
<td>Last day of class</td>
</tr>
<tr>
<td>Monday - Thursday, December 4-7</td>
<td>Final Exam is available</td>
</tr>
</tbody>
</table>

Grading:
The course will be graded based on a total of 1000 total points available:

<table>
<thead>
<tr>
<th>Grading Scheme</th>
<th>ITEM</th>
<th>Nbr</th>
<th>Value</th>
<th>Tot Pct</th>
<th>Value out of 1000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Discussion (case) questions</td>
<td>6</td>
<td>2%</td>
<td>12%</td>
<td>120 out of 1000</td>
</tr>
<tr>
<td></td>
<td>Chapter quizzes (lowest of 9 dropped)</td>
<td>8</td>
<td>1% ea.</td>
<td>8%</td>
<td>80 out of 1000</td>
</tr>
<tr>
<td></td>
<td>Lab assignments</td>
<td>8</td>
<td>5% ea.</td>
<td>40%</td>
<td>400 out of 1000</td>
</tr>
<tr>
<td></td>
<td>Individual Project (submitted in two parts)</td>
<td></td>
<td>14%</td>
<td>140 out of 1000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mid-Term Exam</td>
<td>1</td>
<td>12%</td>
<td>12%</td>
<td>120 out of 1000</td>
</tr>
<tr>
<td></td>
<td>Final Exam (somewhat comprehensive)</td>
<td>1</td>
<td>14%</td>
<td>14%</td>
<td>140 out of 1000</td>
</tr>
</tbody>
</table>
Individual Homework Deadline Policies:

- Individual homework assignments are clearly indicated as such. You are expected to do your own work on each of these assignments. Collaboration with other students is not allowed, and if discovered, may result in a zero on the assignment for all students involved.

- All assignments are due on the date indicated in the specific assignment in D2L. Each D2L dropbox has two dates: the due date, when the assignment is due, and an end date, which allows you to submit your assignment up to that end date. Late submissions will be subject to the penalties described below. Assignments submitted within the following time frames will be assessed the following penalties:
  - Within 12 hours of the due date: 5% deduction
  - From 12:01 hours after the due date until 24 hours after the due date: 10% deduction
  - More than 24 hours after the due date, until 48 hours after the due date: 15% deduction

- Unless you have a note from your doctor, your employer, or an extreme personal reason, assignments will not be accepted after the 48 hour deadline listed above. At the end of the semester, no assignments will be accepted after our class’ last class day of the semester, which is Friday, December 1, at 11:59pm.

- Homework and assignments submitted in a method other than outlined will not be graded. You are generally given one to two weeks to complete an assignment. Note that submitting homework electronically means getting your work done early. You should plan ahead for computer or network errors.

Chapter Quizzes

- In an online course that there are two primary methods of promoting student engagement, discussion questions, and online quizzes. We will use both. This section addresses the online quizzes.
- It is presumed that one chapter will be covered per week. While not all chapters will have a quiz, for those that do, the associated quiz will be made available for three days, Monday through Wednesday, the week after the chapter has been covered.
- There are 15 chapters in the text, but the quizzes will cover 9 chapters (no quiz during the week of a test). The lowest of the 9 online quizzes shall be dropped.
- Each quiz will contain 5 or 6 multiple choice questions.

Discussion Questions – Cases

- There will be six discussion questions, each based on a short case study.
- The cases relate to a fictional company, and come from another textbook. Each case will be provided to you.
- You will be asked several questions for each case. There is generally no right or wrong answer, but you should be prepared to defend your responses.
- You will be graded by a standard grading rubric that I use for all discussion questions.
- You will be required to make at least one original post and at least one response post. Each original post will be limited to a maximum of 400 words. Each response post will be limited to a maximum of 200 words. Penalties for going over these limits: 8% of the value of the DQ for an original post, 5% of the value of the DQ for a response post. For example, you score a 92%, which translates to 0.92 x 20 = 18.4. But your original post went over the limit. Now your score is an 84% or 0.84 x 20 = 16.8
Test Policies

• Your tests will consist of a combination of multiple choice/T-F and essay/short answer questions.

• Mid-Term Exam: You will be given 3 days to take the mid-term exam. If there is any reason why you cannot take the exam during that time-frame, you will need to notify me in advance if you cannot take this test. Failure to do so, without a medical excuse or extreme emergency that can be documented, will result in a late assessment of a 15% deduction on the test. Make-ups of this exam, with or without the deduction of 15%, will only be given within one week of the original test. No make-up will be given more than one week after the original date of a test – in this case, the test will be scored as a zero.

• Final exam policy:
  o The Final Exam is mandatory. While it will predominantly contain material covered since the mid-term exam, approximately 5 to 10% of the questions will come from important material covered before the mid-term exam.
  o You will be given three to four days to take the exam. If there is any reason why you cannot take the exam during that time-frame, you must notify me immediately. Failure to take the exam during the assigned time-frame without a legitimate reason made known to me in advance will result in a zero for the exam. The final exam cannot be given after the end of the test period (since it will most likely end at 11:59pm on Thursday of exam week, it REALLY cannot), so if you have a valid reason why you cannot take it on the test date, you must notify me in advance to have it specially scheduled.

• To lessen the chances of collusion, the following two precautions will be taken in creating your tests online:
  o All questions will be drawn from a database containing more questions than will be given. While most, if not all, students will have many of the same questions, many students will have a different set of questions presented to them.
  o The tests will have what is known in D2L as a “view” attached to them. This “view” will allow you to see the answers to the questions, but it will prevent you from seeing the answers until the test period has ended.

• Failure to take any test, without a written note from a doctor, or if related to a business trip, without a written excuse from your business, will result in a zero for that test.

Semester Individual Project Policies:

• An individual project will be assigned prior to the mid-term
• More specific policies will be given when the project is assigned.

Virtual Lab Exercises

• Lab exercises will be performed using the Virtual Security Cloud Lab. As pointed out above, these are easily accessible because they are written in HTML5. You will be provided a link in D2L to the labs.
• Thorough how-to-use instructions will be provided.
Extra Credit

- Extra Credit assignments and/or quizzes are a privilege, not a right. Such assignments/quizzes may be given at my discretion.
- To be fair to all students, such assignments/quizzes will only be offered to the entire class. Individual extra credit assignments/quizzes will not be given.
- Under no circumstances will any such assignments/quizzes be given after our class’ last day of class, Friday, December 1. This includes after final grades have been posted online in D2L and subsequently to SHIP. At that point, all grades are final, and no additional assignments/quizzes will be given to adjust any final course grades.
- 15 points overall extra credit will be available to all students who have submitted proof of submission of their Smart Eval of me and the course. Proof does not mean your answers to the survey questions, which are to remain private and anonymous. Proof means a screenshot of the submission completion notice you receive when you have completed the Smart Eval. Submission (screenshot attached to a D2L e-mail) MUST be made by 5pm on Friday, December 1. No submissions will be accepted after that date and time.

Changes to Syllabus

- As your professor, I reserve the right to change the class schedule, including assignments, labs, and tests, only if prior notice is given to the class.
- Changes due to natural disasters, in the event classes have been canceled by the university and/or an evacuation has been ordered by the Chatham Emergency Management Agency (CEMA). I have the right to:
  - Cancel assignments or tests
  - Revise due dates for assignments not canceled; revise the date of tests
  - Revise components of assignments or tests
  - Revise the value of assignments or tests
  - Revise the overall value of the course (e.g. the course will now be worth 940 instead of 1000 points)

  Such changes will be broadcast to you via D2L e-mail. If classes are canceled and/or an evacuation is ordered, you are responsible for, as best as possible, keeping up with university BLAST updates and changes issued by me via D2L e-mail. Changes to the course will only be issued from me to you by D2L e-mail and D2L announcements.

Plagiarism and Cheating

- Violations of the Armstrong State University Academic Integrity Policy (including cheating and plagiarism) are taken very seriously. Any violation of this policy will become part of the student’s permanent educational record. More information on the Academic Integrity policy and procedure can be found at www.armstrong.edu/studentintegrity.
- In this class, the textbook homework assignments, lab exercises (unless otherwise specified), and exams must be your own work. Work on the group project may be collaborative, but, as will be pointed out in the project guidelines, an individual grade will be given, and thus it is presumed that the student whose name is on a particular deliverable/document is the student who did the work.

  STUDENTS ARE PROHIBITED FROM USING COPYRIGHTED, PLAGIARIZED MATERIAL SUCH AS INSTRUCTOR MANUALS/SOLUTIONS OBTAINED EITHER ONLINE OR FROM ANOTHER STUDENT. ANY WORK FOUND TO HAVE BEEN
SUBMITTED IN VIOLATION OF THIS POLICY SHALL RECEIVE A ZERO, AND THE POSSIBILITY THAT THE STUDENT(S) INVOLVED MAY BE TURNED IN TO THE AASU HONOR COURT.

- Submitting a corrupted file, i.e., a file that cannot be opened by me, for an assignment, will result in a zero for that assignment. Be sure that you do NOT submit a shortcut to a file, i.e., that you submit the file itself. Be sure that the file you submit will indeed open before submitting it. Students will NOT be given extra time to complete an assignment if I cannot open it.

- It is recognized that there may need to be research done online to complete some of the assignments. The ACM format for properly referencing material obtained online will be provided to you online and you are expected to use it. Any material submitted referencing material obtained online that has not been properly sourced will receive a zero.

Title IX

Armstrong is dedicated to providing a safe and equitable learning environment for all students. Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Title IX Office in Victor Hall Room 245 or by email diversity@armstrong.edu. This is important for the safety of the whole Armstrong community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The University Counseling Center provides 24/7 confidential support, and the https://www.armstrong.edu/health-safety/counseling-center describes reporting options and other resources.
Disability Related Accommodations

Armstrong State University is committed to providing reasonable accommodations to students with documented disabilities, as required under federal law. Disabilities may include learning disabilities, ADD, psychological disorders, brain injury, Autism Spectrum Disorders, serious chronic medical illnesses, mobility impairment, communication disorders, vision or hearing loss or temporary injuries. The purpose of disability accommodation is to provide equal access to the academic material and equal access to demonstrate mastery of the material. Students with disabilities must meet all the academic requirements and standards of the class, including the attendance policy. If you have a disability and need accommodations, please contact the Office of Disability Services, located on the second floor of Memorial College Center, room 208. You will need to meet with Disability Services Staff, who can help you gather documentation of your disability or refer you to an appropriate resource for assessment. Once documentation of the disability is gathered and approved, Disability Staff will provide you with an Accommodation Letter, detailing the appropriate, approved accommodations, which you should present to me so we can discuss and implement your accommodations. Disability accommodations work best starting at the beginning of the semester, but can be approved and started at any point in the semester. Accommodations start at the time the Accommodation Letter is presented to faculty, within reasonable timelines. Accommodations are not given retroactively. Accommodations are not part of your academic transcript.

Campus Carry

In the 2017 legislative session, the Georgia Legislature passed, and the Governor signed, House Bill 280, otherwise known as “Campus Carry,” regarding the carrying of concealed weapons on USG campuses. For more information on this, please consult the information located on the web page below.

Campus Carry
# Detailed Semester Schedule

<table>
<thead>
<tr>
<th>Week # Begins</th>
<th>Ch(s)</th>
<th>Topic - Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – August 14</td>
<td>1</td>
<td>Fundamentals of Network Security</td>
</tr>
<tr>
<td>2 – August 21</td>
<td>2</td>
<td>Firewall Fundamentals</td>
</tr>
<tr>
<td>3 – August 28</td>
<td>3</td>
<td>VPN Fundamentals; <strong>Quiz 1 on Ch 2</strong></td>
</tr>
<tr>
<td>4 – September 5</td>
<td>4</td>
<td><em>Monday is Labor Day, ASU is closed.</em> Network Security Threats and Issues; <strong>Quiz 2 on Ch 3:</strong> Lab, Using Social Engineering assigned</td>
</tr>
<tr>
<td>(Tuesday)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 – September 11</td>
<td>5</td>
<td>Network Security Implementation; <strong>Quiz 3 on Ch 4</strong></td>
</tr>
<tr>
<td>6 – September 18</td>
<td>6</td>
<td>Network Security Management; <strong>Lab, Investigating and Responding to Security Incidents, assigned.</strong> Project assigned</td>
</tr>
<tr>
<td>7 – September 25</td>
<td>7</td>
<td>Firewall Basics; <strong>Lab, Configuring pfSense Firewall on a Client assigned; Mid-Term Exam covers Chapters 1-6</strong></td>
</tr>
<tr>
<td>8 – October 2</td>
<td>8</td>
<td>Firewall Deployment Considerations; <em>Mid-Term (last day to withdraw without WF) on Wednesday of this week; Quiz 4 on Ch 7; Lab, Configuring pfSense on a Server assigned</em></td>
</tr>
<tr>
<td>9 – October 9</td>
<td>9</td>
<td>Firewall Management and Security Concerns; <strong>Quiz 5 on Ch 8; Lab, Penetration Testing on a pfSense Firewall assigned</strong></td>
</tr>
<tr>
<td>10 – October 16</td>
<td>10</td>
<td>Using Common Firewalls 7</td>
</tr>
<tr>
<td>11 – October 23</td>
<td>11</td>
<td>VPN Management; <strong>Lab, Configuring a VPN Network Server assigned</strong></td>
</tr>
<tr>
<td>12 – October 30</td>
<td>12</td>
<td>VPN Technologies; <strong>Quiz 6 on Ch 11</strong></td>
</tr>
<tr>
<td>13 – November 6</td>
<td>13</td>
<td>Firewall Implementation; <strong>Quiz 7 on Ch 12; Lab, Configuring a VPN Client for Secure File Transfers assigned</strong></td>
</tr>
<tr>
<td>14 – November 13</td>
<td>14</td>
<td>Real-World VPNs; <strong>Quiz 8 on Ch 13; Lab, Attacking a VPN assigned</strong></td>
</tr>
<tr>
<td>15 – November 20</td>
<td></td>
<td><em>Thanksgiving Break, Monday 11/20 – Friday 11/25</em></td>
</tr>
<tr>
<td>16 – November 27</td>
<td>15</td>
<td>Perspectives, Resources, and the Future; <strong>Quiz 9 on Ch 14</strong></td>
</tr>
</tbody>
</table>

Labs are indicated in **bold blue** text. Quizzes and tests are in **bold red** text.
Virtual Security Cloud Labs

The new online Virtual Security Cloud Labs (VSCL) delivers a first-of-its-kind cloud computing environment using cutting edge technology. These hands-on labs provide a fully immersive mock IT infrastructure enabling students to test their skills with realistic security scenarios; scenarios they will encounter in their future careers. The mock IT infrastructure was designed to mimic a real-world IT infrastructure consisting of the seven domains of a typical IT infrastructure.

Figure 1 – Seven Domains of Information Systems Security Responsibility

The VSCL’s mock IT infrastructure consists of the following three major components:

- Cisco Core Backbone Network
- Virtualized (VM) Server Farm
- VM Instructor and Student Workstations

At the core of the mock IT infrastructure is a Cisco core backbone network. The use of the Cisco core backbone network for computer network security provides a real-world, representation of a typical IT infrastructure. This also requires proper preparation and loading of IOS image files and configuration files into/from the Cisco router and a TFTP server.
Figure 2 – The VSCL’s Mock IT Infrastructure

The second component of the VSCL is the VM server farm. This virtualized server farm (“A”) consists of Microsoft Windows and Ubuntu Linux servers running native, as well as, open source and freeware applications and services. The purpose of the VM server farm is to mimic production services and applications that the lab requires.

The VM server farm can connect to either the Instructor workstation (“B”) or the Student workstation (“C”) as long as the DHCP host range and IP default gateway router definitions are set properly. These workstations, which comprise the third component of the VSCL, are configured with all required client applications and tools pre-installed.