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          Monday – Wednesday, 1:30 to 2:45
Classroom          SC 1503A
Office/Phone       SC 210/344-3192
E-mail             My current e-mail address is frank.katz@armstrong.edu, but sometime after the start of the semester, this will become fkatz@georgiasouthern.edu
Contacting me via e-mail: although I have provided my ASU e-mail address above, in order to centralize/store/consolidate e-mails, I prefer that students use the e-mail function incorporated in Desire-2-Learn (D2L) as the primary method of e-mail communication. Assignments are to be submitted via D2L assignment drop boxes, but in the event that an assignment must be e-mailed to me, it MUST be e-mailed as an attachment to a D2L e-mail. I will NOT grade assignments sent to my regular e-mail address.

Personal website  http://infotech.armstrong.edu/katz/katz/katzhome.html
Office Hours      My posted office hours are: MW 11:00 am-noon; TTh 1 pm to 3:30pm; F 10 am to noon. I am also available by appointment
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.

• Despite that you will be performing a Jones & Bartlett online lab doing Pen Testing the pfSense Firewall and Attacking a VPN, you will also get hands-on lab experience to perform penetration testing using Kali Linux installed on VirtualBox. To that end:
  o You will have access to 64-bit VirtualBox in lab SC 1503A, but you may have to install it yourself on your own laptop or PC
  o You will have to install Kali Linux on VirtualBox in the lab, and may have to install it yourself on your own laptop or PC.
  o All required instructions will be provided to you.

**IMPORTANT DATES**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, January 8</td>
<td>First day of class</td>
</tr>
<tr>
<td>Monday, January 15</td>
<td>MLK Jr. Holiday, ASU closed</td>
</tr>
<tr>
<td><strong>Wednesday, Feb 28</strong></td>
<td>Mid-term, last day to withdraw without a WF; if you withdraw after this date, the Registrar will automatically assign a WF</td>
</tr>
<tr>
<td>Monday March 12 – Friday March 16</td>
<td>Spring Break</td>
</tr>
<tr>
<td><strong>Wednesday, April 25</strong></td>
<td>Last day of OUR class; Friday, April 27 is the last day of class for the university</td>
</tr>
<tr>
<td><strong>Wednesday, May 2, 1pm-3pm</strong></td>
<td>Final Exam</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>
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</thead>
<tbody>
<tr>
<td></td>
<td>In-Class Presentation &amp; Discussion</td>
<td>2</td>
<td>5% ea.</td>
<td>10%</td>
<td>100 out of 1000</td>
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<tr>
<td></td>
<td>Kali Linux Penetration Lab Exercises</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Lab assignments</td>
<td>8</td>
<td>5% ea.</td>
<td>40%</td>
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<td>Individual Project (submitted in two parts)</td>
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<td>14%</td>
<td>140 out of 1000</td>
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<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:

- All assignments (whether traditional assignments or lab 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, even by just seconds, will be subject to the penalties described below. The “late period” will generally last two days after the due date.

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: 15% deduction
  - These penalties are non-negotiable. Ignorance of the due date/time and end/late date/times are NO excuse.

- Unless you have a note from your doctor, your employer, or an extreme personal reason (e.g. death in the family, extreme illness, business trips), assignments will not be accepted after our class’ last class day of the semester, which is Wednesday, April 25.

- Assignments will NOT be accepted in any other method other than described above. They MUST be submitted to the appropriate D2L dropbox.

  - Under NO circumstances will submissions e-mailed to my regular e-mail address be accepted.
  - In the event you have a legitimate excuse for turning in an assignment after the end date (see bullet point above for such excuses), it MUST e-mailed to my D2L inbox.

- Homework and assignments submitted in a method other than outlined will not be graded. Note that submitting homework electronically means getting your work done early. Plan ahead for computer or network errors.

- Homework assignment questions are to be answered in black text only. Red is not to be used, as it is reserved for the instructor to use to grade your work. Answers submitted in a color other than black will not be graded. In addition, you do not need to specify your answer by prefacing it with “Answer”. When reading your work, I can easily tell what your answer is without it being explicitly stated.

- If the question only requires one answer, there is no reason to use bullet points. If you are going to use bullet points, use MS Word’s bullet point function, don’t create your own by placing a – or any other character in front of your text. In addition, try to avoid using auto-numbering in your answers.

- Grammar and spelling requirements: Answers to questions on assignments are expected to meet strict spelling and grammatical requirements.

  - Other than obvious typographic errors, any answer to any question containing more than one be assessed a 1 point deduction.
Test Policies

- Your tests will consist of a combination of multiple choice/T-F, and short answer questions. The multiple choice/T-F questions will be graded via Scan-Tron sheets. The short answer questions will be graded by hand. In addition, you will have various extra credit questions, which will require you to write short answers or solve problems, some which might be mathematical.

- **Mid-Term Exam:** You will need to notify me in advance if you cannot be present for 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:**
  - 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.
  - Failure to show up for the exam at the appointed date and time without a legitimate reason made known to me in advance will result in a zero for the exam. The final exam will not be given after the test date, 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.

- **Use of “helping” materials on tests:** the use of any “helping materials” on tests, such as note cards, etc., is at the discretion of the professor and will be announced prior to the test. If such material is allowed, you will be provided with a standardized method to use on the test. No other material will be allowed.

In Class Presentations

- In order to discuss current topics in information security, students will be required to make an in-class presentation on a selected topic.
- Each student will be required to make one such presentation.
- Requirements and grading schema will be provided in a separate document.

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.

Kali Linux Pen Testing Lab Exercises

- These lab exercises will be done using Kali Linux on VirtualBox. VirtualBox is installed in our lab SC 1503A, but Kali Linux is not. Consequently, part of your assignment will be to install Kali Linux in VirtualBox.
- You may have to perform BOTH installations on your own PC.
- Thorough step-by-step 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, April 27. 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, April 27. 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:
  o Cancel assignments or tests
  o Revise due dates for assignments not canceled; revise the date of tests
  o Revise components of assignments or tests
  o Revise the value of assignments or tests
  o Revise the overall value of the course (e.g. the course will now be worth 940 instead of 1000 points)
  o 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 Georgia Southern 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

Georgia Southern 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

Georgia Southern 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 #, Days (MW)</th>
<th>Ch(s)</th>
<th>Topic - Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Jan 8-10</td>
<td>1</td>
<td>Fundamentals of Network Security</td>
</tr>
<tr>
<td>2 - Jan 17 (Weds)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MLK Jr. Holiday on Monday, Armstrong Campus is closed; Firewall Fundamentals; Lab, Using Social Engineering assigned</td>
</tr>
<tr>
<td>3 - Jan 22 – 24</td>
<td>3</td>
<td>VPN Fundamentals</td>
</tr>
<tr>
<td>4 - Jan 29 – 31</td>
<td>4</td>
<td>Network Security Threats and Issues; Lab, Investigating and Responding to Security Incidents, assigned.</td>
</tr>
<tr>
<td>5 - Feb 5 – 7</td>
<td>5</td>
<td>Network Security Implementation</td>
</tr>
<tr>
<td>6 - Feb 12 – 14</td>
<td>6</td>
<td>Network Security Management; Project assigned; Lab, Configuring pfSense Firewall on a Client assigned</td>
</tr>
<tr>
<td>7 - Feb 19 – 21</td>
<td>7</td>
<td>Firewall Basics; Mid-Term Exam covers Chapters 1-6</td>
</tr>
<tr>
<td>8 - Feb 26 – 28</td>
<td>8</td>
<td>Firewall Deployment Considerations; Mid-Term (last day to withdraw without WF) on Wednesday of this week; Lab, Configuring pfSense on a Server assigned</td>
</tr>
<tr>
<td>9 - Mar 5 – 7</td>
<td>9</td>
<td>Firewall Management and Security Concerns; Lab, Penetration Testing on a pfSense Firewall assigned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spring Break, March 12 – 16</td>
</tr>
<tr>
<td>11 - Mar 19 – 21</td>
<td>10</td>
<td>Using Common Firewalls 7; Kali Linux labs, using Virtual Box, assigned</td>
</tr>
<tr>
<td>12 - Mar 26 – 28</td>
<td>11</td>
<td>VPN Management; Lab, Configuring a VPN Network Server assigned</td>
</tr>
<tr>
<td>13 - Apr 2 – 4</td>
<td>12</td>
<td>VPN Technologies</td>
</tr>
<tr>
<td>14 - Apr 9 – 11</td>
<td>13</td>
<td>Firewall Implementation; Lab, Configuring a VPN Client for Secure File Transfers assigned</td>
</tr>
<tr>
<td>15 - Apr 16 – 18</td>
<td>14</td>
<td>Real-World VPNs; Lab, Attacking a VPN assigned</td>
</tr>
<tr>
<td>16 - Apr 23 – 25</td>
<td>15</td>
<td>Perspectives, Resources, and the Future</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wednesday, May 2, 1 – 3 pm</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.
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.