1. Objectives

This project provides each individual in this course with an opportunity for conducting research on the latest advances on a particular problem in network security. There are three objectives in this project. The first objective is to understand the mechanism(s) of how a particular security attack is launched. The second objective is to learn the existing solution(s) to prevent or mitigate the damages from the attack. The third objective is to analyze the effectiveness (i.e., the strengths and weaknesses) in each existing solution you focused on. The ultimate goal of this project is to provide research experience for the topics on network security. This project is an individual project. The topic for your research can be chosen from the list of the course topics in the course syllabus or from other sources.

2. Required activities

**Step 1:** Find a survey paper that discusses a topic in network security

The source of the research articles you use for your survey project must be peer-reviewed academic articles (journals, academic conference proceedings, and academic magazine, such as “IEEE Networks”).

**Step 2:** Perform preliminary paper review to document the following details:

(a) Declare an issue in network security you would like to survey.

The topic should be specific issue in network security. For example, a topic of “intrusion detection systems (IDS)” is not specific enough. More focused issue related to IDS is required. There are quite many specific technical issues related to IDS. For example, the false positives/negatives, the accuracy in “training anomaly patterns”, and capability to deal with “zero-day-attacks” are the major research areas related to IDS.

(b) List at least three existing solutions for a particular issue.

In the survey paper you found, you need to select at least three existing solutions for the security issue you declared in (a) above (the existing solutions you selected should be for those for the same issue).

(c) Summarize (briefly describe) how each of the existing solutions you chose solves the security issue you focused on.

If possible, describe how each of the existing solutions solves the security issue using one to three paragraphs. In summarizing the ideas, you must use your sentences. You can use nouns from the papers you are reviewing, but you can not use any whole sentence in doing this. Transforming a sentence, without adding your words, is also considered plagiarism. See the following example:
A: “Administrators can monitor network communications, as well as the contents of the messages exchanged through network connections, and can even tamper access logs, including the ones for the administrators themselves in some circumstances.”

B: “Network communications, as well as the contents of the messages exchanged through network connections, can be monitored by administrators. Even access logs, including the ones for the administrators themselves in some circumstances, can be monitored by administrators.”

The above two sentences are considered as the same sentence (A is the original and B is plagiarized sentence).

Step 3: Analyze the major strengths and weaknesses in each of the existing solutions you described in Step 2.
- Most of the engineering solutions are not perfect. Most of them usually have certain strengths as well as weaknesses (A.K.A. “trade-offs”). For example, an existing solution to improve (reduce) false-positive rate, it minimizes the false-positive rate compared to other two existing solutions, but it causes highest run-time overhead (you need to be specific for “runtime overhead” though).
- Many of existing solutions have some particular pathological cases. Are the pathological cases reasonably rare to happen?
- Many of existing solutions have some assumptions. Are the assumptions fair?

Step 4: Organize your achievements of Step 1 through 3 above into a PPT presentation and present your work at the end of the semester.
- The final presentation will be evaluated using the peer-review method (anyone who does not participate in reviewing other teams’ work will not get credit for his presentation).
- Each team organize your work so that your audience can understand.
- How each of the existing solutions work should be technically described. The same for your analyses.
- Each member in a team can have different project grade.
- Each slide presented in the final presentation has to have the name of the person who created the slide.
- Each team has 35 minutes to present.

3. Procedure and Time lines

Step 1: 10% of the project grade
Round 1: By August 26 (M), find three potential survey papers and e-mail them to Dr. Fujinoki (e-mail: hfujino@siue.edu). Dr. Fujinoki will skim over each of the three papers and will make a suggestion to you or Dr. Fujinoki may suggest you to find other survey papers. If at least one of the three survey papers you found looks decent, Dr. Fujinoki will approve the survey paper (so that you can continue on the topic).
Round 2: September 2 (M) is the deadline of Step 1.

Step 2: 10% of the project grade
Round 1: September 16 (M) is the due for free feed-back for your work for Step 2.
Round 2: September 30 (M) is the final due for Step 2. Whatever grade you have earned for Step 2 on September 30 is your grade for Step 2. Submission of your work by the due date
does not guarantee the fill credit. Your grade for Step 2 is given based on the quality in your work.

**Step 3**: 10% of the project grade  
**Round 1**: October 28 (M) is the due for free feed-back for your work for Step 2.  
**Round 2**: November 8 (F) is the final due for Step 3. Whatever grade you have earned for Step 3 on November 11 is your grade for Step 3. Submission of your work by the due date does not guarantee the fill credit. Your grade for Step 3 is given based on the quality in your work.

**Step 4**: 70% of the project grade  
**Round 1**: November 11 (M) is the due for free feed-back for your work for Step 4 (you can submit your PPT slides to Dr. Fujinoki for his feedback). I can not give your grade for Step 4, but at least constructive feedback will be provided.  
**Round 2**: Each team must present during November 13 (W) through 20 (W). You can not pick their presentation day. Presentation day will be randomly selected at the beginning of the each of the four days. Extra credit will be given for volunteering for November 13, 15, and 18 (volunteering individual should notify to Dr. Fujinoki before the random selection begins). The extra credit is:  
(a) For volunteering on November 13: **12 extra points** (in 100 points for the project grade)  
(b) For volunteering on November 15: **8 extra points** (in 100 points for the project grade)  
(c) For volunteering on November 18: **4 extra points** (in 100 points for the project grade)

4. Academic dishonesty

Any academic dishonesty will result in the zero credit for the course project. Following is a list of the acts of academic dishonesty (but not limited to).

- Use the sentence written by someone else (see the example Step 2 in “Required activities).  
- Use the work performed by someone else (PPT slides, figures, etc.)

5. Peer-review participation rules  
(a) **For CS590 students**: Failing to participate or failing to provide decent peer-review to each presentation will result in the penalty of **10% of your project grade** (being late more than 10 minutes for a final presentation will be considered that you did not participate in a final presentation).  
(b) **For CS490 students**: Failing to participate or failing to provide decent peer-review to each of presentation will result in **-3 point penalty to your final exam** (being late more than 10 minutes for a final presentation will be considered that you did not participate in a final presentation by a team).  
(c) **For CS590 students**: If you are randomly-selected at the beginning of November 13, 15, or 20 (assuming that no one volunteers), the selected person must present. No request for re-scheduling final presentation will be made.  
(d) The above three rules do not apply to any medical emergency (but some proof of the emergency should be provided to Dr. Fujinoki).