Introduction to Networking Module

Module Learning Outcomes: (Please include explicit references to the submitted Grant Learning Outcomes – Appendix 3)

- #2: Explore the use of basic operation systems commands on different platforms.
- #4: Experiment with basic tools and techniques used to attach and/or defend systems.
- #8: Engage in scenario-based learning that allows them to make an educated decisions and take deliberate action online to prevent things from going wrong in first place.
- #12: Apply the knowledge gained in solving real-world, scenario-based problems.

The Module addresses the following First Principles: (Please include explicit references to the First Principles - Appendix 1)

- #4: Domain Separation
- #5: Layering
- #7: Modularity

Description:

This module presents an easy-to-understand introduction to fundamentals of networking. The participants will be introduced to the networking stack including both the OSI and Internet stack and the functionality of each layer and its importance. Various addresses that are used in the networking stack will be introduced along with the importance of each address and the translation mechanism used to go from application layer address to IP address to the physical address. Various commands using the command line, windows based applications, and web applications will be used to illustrate the concepts and demonstrate the principles of networking. From a security perspective concept of how a firewall works (including both port based firewalls and application based firewalls) will be introduced. Other security concepts like proxy and whitelisting will also be introduced. Concepts related to encryption during network connections will be introduced. The importance of encrypting your wireless connection and use of VPNs will also be discussed.

Learner-centered classroom:

This module is designed to be taught in a highly interactive environment in which all attendees will be active participants in the learning process. To achieve that, one approach is to use a series of lab-based activities to enable students to "do it yourself" in order to enhance their comprehension of taught contents. Such lab activities include basics of windows commands, use of windows built-in utilities, and some web based applications. Participants will be encouraged to take the learning with them and apply the principles to their home networks and daily life. They will be encouraged to troubleshoot and secure their networks for optimal performance.

Assessment:

This component of the module is designed to use a variety of formative assessment strategies in order to ensure that the students has acceptably achieved the Intended Learning Outcomes (ILOs) of the module. Examples of the proposed techniques are use of discussion, questioning, peer-assessment, and constructive quizzes. For example, a carefully chosen set of questions on the

covered topics can form a quiz given at the end of this module. After the students finish the quiz, all quiz questions will be reviewed and proper answers will be identified. This positively contribute to productive discussions in the classroom and increase the chances of students achieving higher degrees of learning.

Suitability to various groups:

The contents the module will be adapted to better fit the level of each of the proposed three groups. For the teachers group, topics covered will stress how the networking concepts and techniques can be integrated into the K-12 curriculum in addition to covering advanced concepts such as IPv6, its representation and its co-existence with IPv4. The contents will also advance in the level of detail when being presented to the Middle school group compared to when being presented to the High school students.

How the Teachers and Students groups will be interacting:

This module will not have explicit interaction amongst the three groups. Contents covered in the teachers group will primarily focus of how to integrating these security concepts in the K-12 curriculum, while those to students will focus on kindling their interest in the area of cybersecurity. Also, input from the teachers will be sought on how to better deliver the module contents to the other two students groups. We also are planning a culminating competition-based activity among all three groups towards the end of the camp.