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 attack and/or defend systems.
- #8: Engage in scenario-based learning that allows students 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. This will be used to illustrate the concepts of layering and modularity. Discussion of the DNS and ARP will be included to address the concepts of logical and physical. Various networking 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. The module will adopt different pedagogies for middle and high school students. The Middle school students will have more emphasis on hands on learning while for high school students conceptual basis for what is being done will be stressed.

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 student groups. The contents will advance in the level of detail when being presented to the High School group as compared to when being presented to the Middle school students. The Middle school students will have more emphasis on hands on learning while for High school students conceptual basis for what is being done will be stressed.