CS 1310: CYBERSECURITY FOR BEGINNERS

\[\text{Semester Hours:} \quad 3.0 \quad \text{Contact Hours:} \quad 3\]

\textit{Coordinator:} S. Roy

\textit{Text:} Readings provided by instructor

\textit{Author(s):} VARIED

\textit{Year:} Varied

SPECIFIC COURSE INFORMATION

\textit{Catalog Description:}

Cyber threats in day-to-day computer use, Web security issues and countermeasures, vulnerabilities of smart phones and their mitigation, common cyber-security technologies, hands-on lab activities. Prerequisites: N/A.

\textit{Course type:} ELECTIVE

SPECIFIC COURSE GOALS

- I can explain the common cyber threats.
- I can use basic cybersecurity tools
- I can securely use a browser to access the Internet
- I can protect my computer
- I can explain the common privacy and security issues of using a smartphone, and I can apply countermeasures

STUDENT OUTCOMES ADDRESSED BY THIS COURSE

- B.2. Use current techniques, skills, and tools in computing practice
- B.4 Understand the impact of professional, ethical, and social issues in computing

LIST OF TOPICS COVERED

- Nuts-and-Bolts of cyber-security (~7%)
o A big picture of the problem: computers, smartphones, the Internet, and threats
o Key components (hardware and software) of a computer, and how they work together
o Representing and storing information in digital form
  ▪ E.g., how a computer processes and stores an English word, etc.
o Pillars of information security: confidentiality, integrity, and availability
• Ethics and Economics of cybersecurity (~15%)
o Tension between cost and security
o Tradeoff between usability and security
o Individual privacy vs. law enforcement
o Ethical hacking
• Fun with encryption/decryption schemes (~7%)
o Overview of one popular encryption/decryption algorithm
o Symmetric key system vs. public/private key system.
• On Password-based authentication (~7%)
o Measuring the strength of a password
o Tools for cracking password, etc.
o How CAPTCHA helps against password cracking
• Access control and authentication (~14%)
o Access control (i.e., read, write, execute permission) of a file in a computer
o Usage of a one-way hash function
o How a computer recognizes a user (user authentication)
  ▪ Case study: Linux system’s scheme for access control and user authentication
o Newer authentication schemes
  ▪ Single-Sign-On (e.g., accessing Canvas via my.bgsu.edu)
  ▪ Multi-factor authentication (e.g., DUO code to login to my.bgsu.edu)
• Security issues in computer networks and web browsing (~15%)
o Basic structure/architecture of the Internet
  ▪ LAN, subnet, IP address.
o Security issues of home/public Wi-Fi; attacks on a web session
  ▪ Man-in-the-middle attack
  ▪ Sniffing computer network traffic (Wireshark tool)
- Stealing Cookie
  - Countermeasures
    - Public key infrastructure (PKI), Virtual Private Network (VPN).
- Software vulnerability/maliciousness. (~7%)
  - Security issue/hole in software
  - Intentional maliciousness vs. unintentional vulnerability.
- Common schemes of cyber-attacks and countermeasures: (~7%)
  - Social Engineering, phishing, drive-by-download, clicking email-attachment
  - Spyware, adware, ransomware
- Security and privacy issues of smartphones (~7%)
  - Basic design of an android/iPhone app
  - Security and privacy issues of online social networks (~7%)
    - Privacy issues in sharing information publicly
    - Security and privacy issues of online social networks (~7%)
  - Common threats and Countermeasures
- Protecting a personal computer (~7%)
  - Why to run only updated software on a computer
  - How to safely install software only from a trusted party
  - Running an antimalware (and firewall) to protect a computer