Unit 4: Cryptography & Linux

Content Area: **Business**
Course(s): **Generic Course**
Time Period: **Semester 1**
Length: **3 weeks**
Status: **Published**

Standards

	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.7	Examine the professional, legal, and ethical responsibilities for both employers and employees in the global workplace.
TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.12.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.12.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.12.E	Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.
TECH.8.1.12.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.
TECH.8.2.12	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.12.A	The Nature of Technology: Creativity and Innovation: Technology systems impact every aspect of the world in which we live.
TECH.8.2.12.B	Technology and Society: Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.
TECH.8.2.12.C	Design: The design process is a systematic approach to solving problems.
TECH.8.2.12.D	Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
TECH.8.2.12.E	Computational Thinking: Programming: Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Enduring Understandings

The purpose of crypotology is not to hide the existance of a message, but rather to hide its meaning.

Algorithms can be used to hide information.

Essential Questions

- How is information protected on the Internet?
- What is the process to turn plaintext into ciphertext?
- What is needed to decrypt a message?
- What are some common attacks against ciphers?
- What is the primary difference between symmetric and asymmetric cryptography?
- What are the two basic uses for asymmetric cryptography?
- How can you check Certificate Authorities used for web browsing?
- How has cryptography played a major role in warfare?

Knowledge and Skills

After completing this unit, students can:

Section 4.1: Bits, Bytes and Encoding

- Understand that computer language is based on electrical signals called binary code
- Apply binary math to explore how electrical bits are translated into human language.
- Recognize the digits that make up the hexadecimal number system (base 16)
- Explore the uses for hexadecimal numbers in computing
- Define Encoding and the uses in computing
- Establish the difference between encoding and encryption

Section 4.2: Cryptography Basics

- Examine cryptography vocabulary terms and methods of encryption
- Identify cryptographic algorithms and define how they can be used to help improve security
- Define steganography as an alternative method of encryption that does not rely on a key
- Examine and apply steganography methods to hide or extract information

Section 4.3: Advanced Linux

- Review the basic CLI commands for file access and manipulation for Linux (covered in Unit 1.3)
- Apply advanced Linux CLI commands
- Define CLI commands useful for investigation
- Define concepts of shells and scripting

- Apply knowledge of CLI commands to write basic scripts
- Analyze the cybersecurity impact of scripts
- Evaluate student mastery of concepts covered in Cryptography Unit
- Use news resources to analyze controversies, select and evaluate evidence, construct and refute arguments

Transfer Goals

Students will apply knowledge of cybersecurity concepts to engage in discussions of current events.

Students will practice digital citizenship which is an important part of 21st century culture.

Students will understand that complex mathematical models are used to keep data secure.

Students will be able to use ethical reflection and judgment regarding benefits and harms to make decisions.

Students will be able to think critically to evaluate the trust and credibility of organizations.

Students will know the importance of keeping their data secure and private.

Students will install computer updates as soon as they become available.

Students will develop a security mindset which is the ability to identify what might go wrong.

Students will be able to keep themselves and their data safe.

Resources

Curriculum is based on the Garden State Cybersecurity Curriculum