

Lesson Plan: Introduction to CyberChef

Grade Level: High School (AP CSP, AP CSA, or CS II)

Duration: 1 Class Period (45-60 minutes)

Learning Objectives:

- Understand the purpose of CyberChef as a data transformation and analysis tool.
- Learn how to use basic CyberChef recipes to encode, decode, encrypt, and decrypt data.
- Explore different operations like hashing, obfuscation, and format conversions in cybersecurity contexts.

Materials Needed:

- Computers with internet access
- Access to CyberChef (<https://gchq.github.io/CyberChef/>) – add to Forensics web page
- Pre-prepared datasets or example text files
- Projector or shared screen for live demonstration

Lesson Outline:

1. Introduction to CyberChef (10-15 minutes)

Discussion Topics:

- What is CyberChef? (Web-based tool for data manipulation and analysis)
- Why is CyberChef used in cybersecurity? (e.g., forensics, encoding, decoding, and analyzing data)
- Real-world applications (decrypting malware, analyzing log files, encoding data)

Demonstration:

- Brief live demo of CyberChef's interface: Input field, Operations, Recipe panel, and Output field.
- Example: Convert text from uppercase to lowercase using a simple operation.

2. Hands-on Activity 1: Encoding & Decoding (15-20 minutes)

Instructions:

- Have students input a piece of text (e.g., 'Hello, World!') into the input field.
- Create a recipe to Base64 Encode the text.
- After encoding, create another step in the recipe to Base64 Decode the result back to the original text.

Key Takeaways:

- Explain how encoding works (data transformation).
- Discuss the importance of encoding in cybersecurity (hiding data for transmission).

3. Hands-on Activity 2: Encryption & Decryption (15-20 minutes)

Instructions:

- Students input a message like "ConfidentialData".
- Create a recipe to encrypt the message using the AES Encryption operation with a simple key (e.g., 'mypassword').
- Then, create another step to AES Decrypt it using the same key to recover the original message.

Key Takeaways:

- Explain how encryption secures data.
- Discuss the difference between encoding and encryption.
- Briefly introduce the concept of symmetric encryption (using the same key for encryption and decryption).

4. Hands-on Activity 3: Hashing (10 minutes)

Instructions:

- Input the same text ('password123') and apply a SHA-256 Hash operation.
- Observe how changing just one character in the text drastically changes the hash.

Key Takeaways:

- Explain what hashing is and its role in cybersecurity (e.g., password storage, integrity checking).
- Discuss the concept of one-way encryption (irreversible).

5. Wrap-Up Discussion (5-10 minutes)

- How can CyberChef be useful in real-world cybersecurity?
- What did you find challenging or interesting about encoding, encrypting, or hashing?
- How can these techniques help protect data in a digital world?

Homework:

- Explore more CyberChef operations and apply them to a piece of text or data file of your choice.
- Write a short reflection on how the operations work and what you learned.