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This presentation was given at the 2023 National Cybersecurity Education Colloquium

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This presentation was given at the 2023
National Cybersecurity Education Colloquium

EPNC Mission

- The mission of the Education Pathway National Center (EPNC) is to establish an effective and sustainable national network of cybersecurity education-to-career pathways.
- The EPNC will promote student success, collaboration between educational institutions and sharing of instructional resources.
- The EPNC network will support initiatives within the CAE community to increase the capacity and diversity of students to meet the future national cybersecurity workforce needs.

Grant Goals

Establish an effective and sustainable national network of education-to-career pathways.

- Establish a **national distribution network** of RING curriculum.
- Create a **pathway for middle and high school students** to NCAE-C schools which will expand the capacity of cybersecurity talent to meet future workforce needs.
- **Promote greater equity, diversity, and success** for underserved and underrepresented communities in the cybersecurity education pathways.

Education Pathway National Center (EPNC)

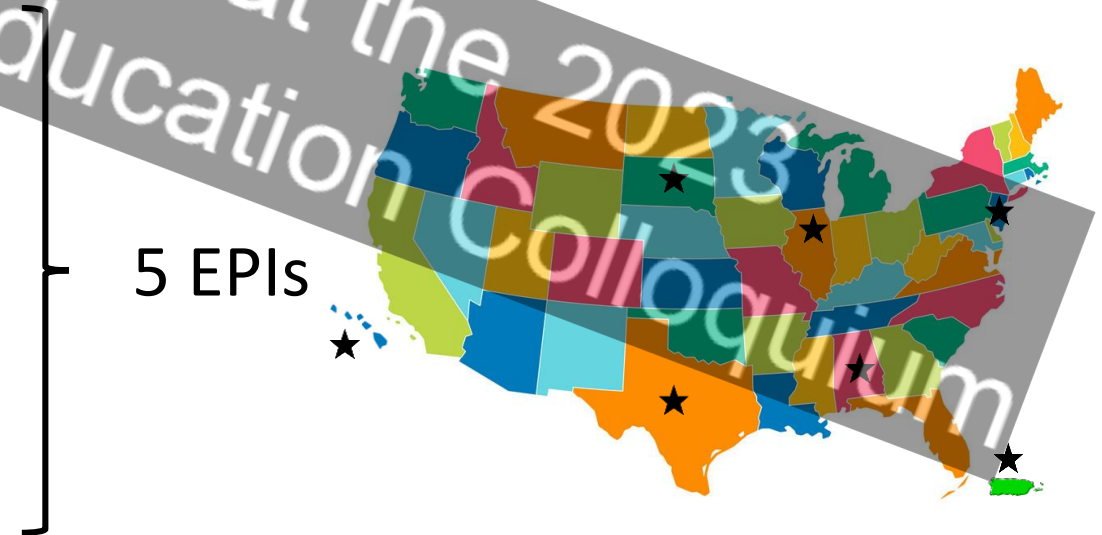
Moraine Valley Community College serves as the NCAE-C Education Pathway National Center (EPNC).

- The EPNC ...
 - Serves as the national resource and coordinator for education pathways to cybersecurity careers;
 - manage NCAE-C initiatives for transition of high school students to post-secondary education;
 - collaborate with Careers Preparation National Center (CPNC);
 - leverage and focus implementation of RING initiative; and
 - collaborate to support faculty development initiatives;

EPNC Consortium

The EPNC will collaborate with six consortium partners to accomplish the grant goals:

- University of Alabama in Huntsville – *RING curriculum management and development coordinator*
- Fairleigh Dickinson University (NJ)
- Dakota State University (SD)
- Collin College (TX)
- Polytechnic Univ of Puerto Rico (PR)
- University of Hawaii – Maui (HI)



This presentation was given at the 2023
National Cybersecurity Education Colloquium

RING
Update

UAH RING Curriculum



Jesse Hairston
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Pedagogical Expert



Katherine MacGilvray
Program Coordinator



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Student Org. Coord.



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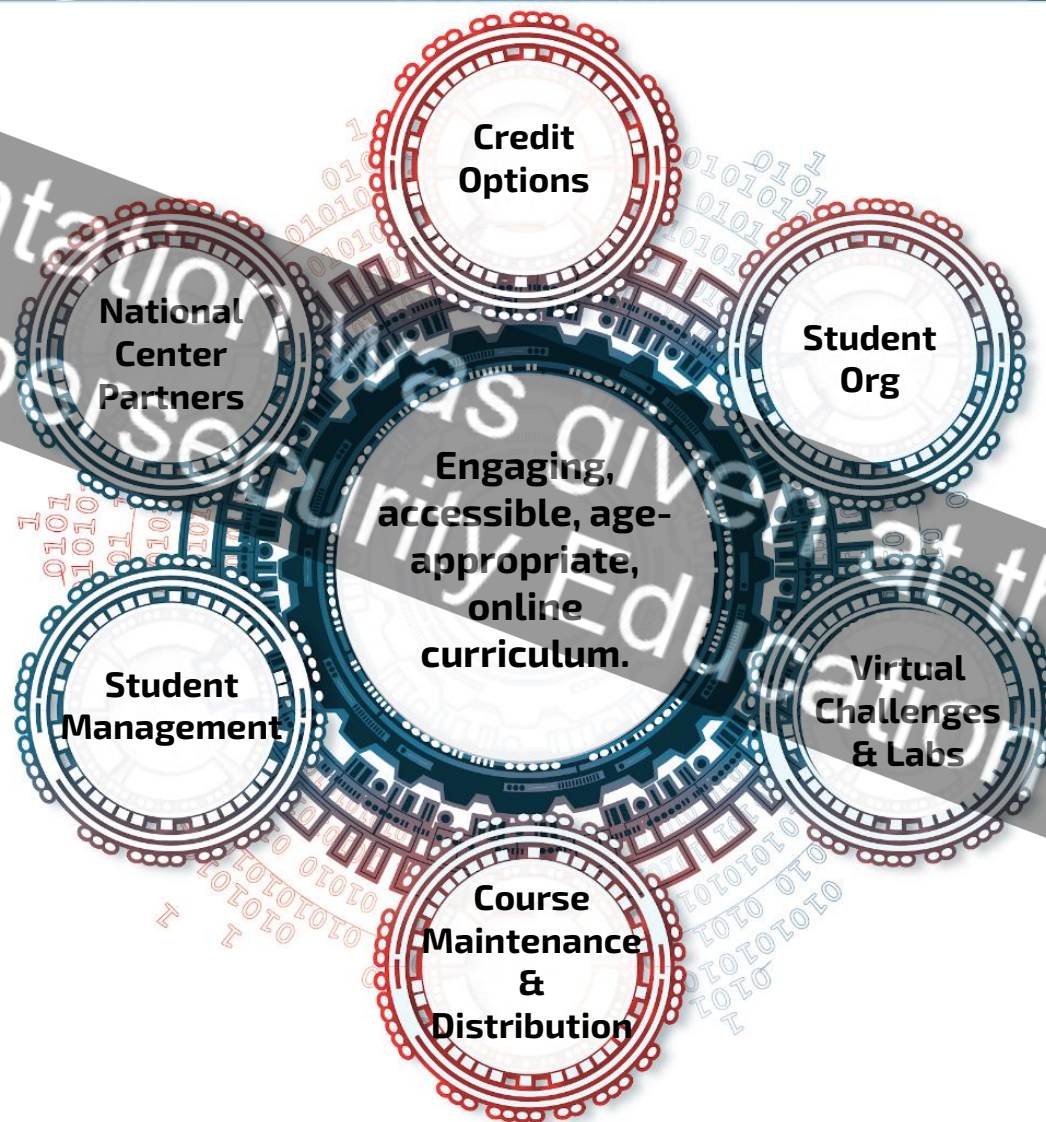


Carolyn Sanderlin
Graphic Designer

RING Overview

RING

Regions
Investing in the
Next
Generation

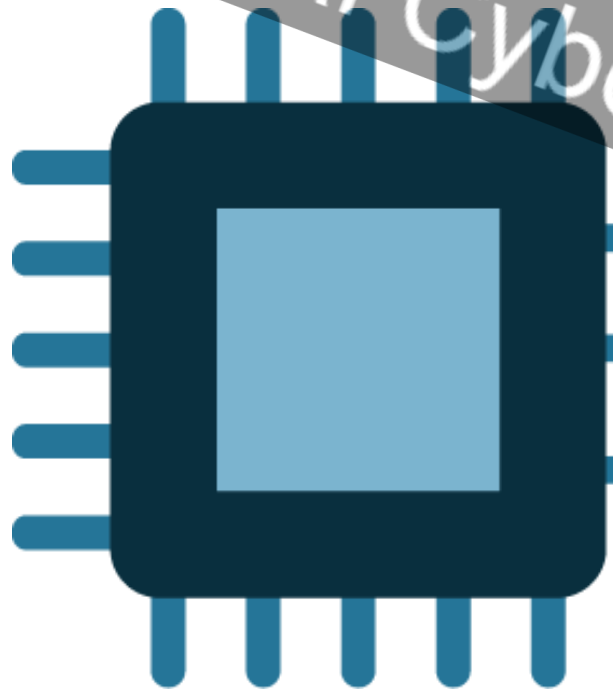


RING is...
Cybersecurity for students without access to a cyber program.

- Rural
- Homeschool
- Under-resourced

Instructing RING

RING instruction is carried out nationwide within three categories.



EPNC Centralized Instruction

EPI Regional Courses

External Instruction

This presentation was given at the 2023 National Cybersecurity Education Colloquium

Instructing RING

1) **EPNC Centralized Instruction** - Seasoned RING educators teach target demographic students in a proven virtual experience

2) **EPI Regional Courses** - EPI partners provide meaningful RING experiences to local area students

3) **External Instruction** -- students learn cybersecurity from their school teachers

with access to RING



Objectives Breakdown

Enduring Understanding	Learning Objectives	Essential Knowledge Statements
1.2: Ethical reflection and judgment are required in considering the potential harms, benefits, and trade-offs involved in cybersecurity.	1.2.1: Students will discuss how cybersecurity can significantly impact the quality of people's lives both positively and negatively.	1.2.1a: Examples in history demonstrate the harms and benefits of cybersecurity from multiple perspectives.
		1.2.1b: There are trade-offs concerning the harms and benefits of cybersecurity, including the tensions between ensuring privacy and enabling convenience and usability.
		1.2.1c: Cybersecurity requires resources, including time, money, and expertise that also affects technological affordances.
These LOs are sub-guidelines of 1.2 EU	1.2.2: Students will give examples of where/how tools are used in ways that were not intended by the system designer.	1.2.2a: The designer assumptions and user assumptions could differ. Another way to say this, the user may not know the assumptions of the designer for using the tool, leading the user to use the tool in a way the designer never intended.
		1.2.2b: Security tools were designed to help system administrators and users to improve security, but an adversary can use the same tools to exploit the target for nefarious goals.

These EKs are sub-guidelines of 1.2.1 LO

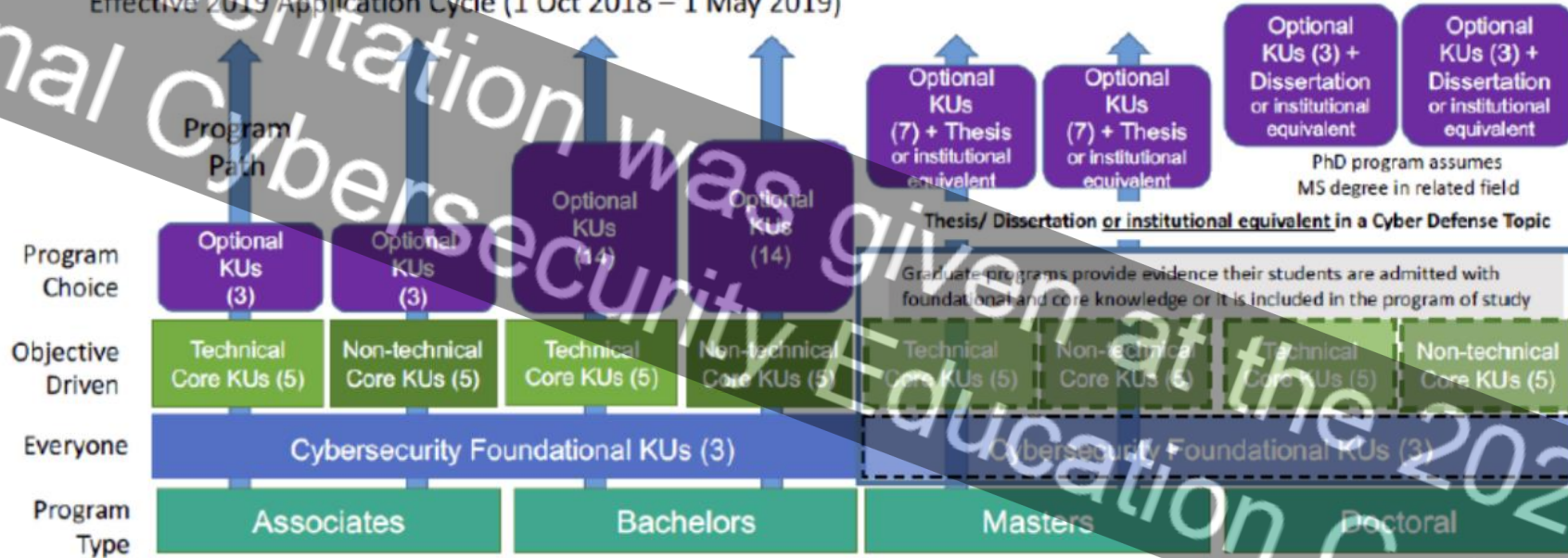
These EKs are sub-guidelines of 1.2.2 LO

This presentation was given at the 2023 National Cybersecurity Education Colloquium

CAE Knowledge Units

Knowledge Unit Usage Notional Structure

Centers of Academic Excellence in Cyber Defense Education (CAE-CDE) Designation Requirements,
Effective 2019 Application Cycle (1 Oct 2018 – 1 May 2019)



Knowledge Units (KUs):

Foundational: Cybersecurity Foundations, Cybersecurity Principles, and IT Systems Components

Technical Core: Basic Scripting and Programming; Basic Networking; Network Defense; Basic Cryptography; Operating Systems Concepts

Nontechnical Core: Cyber Threats; Policy, Legal, Ethics, and Compliance; Security Program Management; Security Risk Analysis; Cybersecurity Planning and Management

Objectives Breakdown

Unit title and Big Idea

Topics from the CAE KU, mapped to the CCG (left)

Learning guidelines from the CCG

Enduring Understanding identifier

Learning Objective identifier

Essential Knowledge Statement identifier

Unit 1: Ethics			
Cybersecurity Curriculum Guidelines (CCG)		Centers of Academic Excellence Knowledge Units (CAE KU) Mapping	
1.1 EU	<i>Social goals reflect the foundational values held by society; these core societal values are reflected in cybersecurity choices.</i>	F.CSFE:17	<i>Ethics (Ethics associated with cybersecurity profession)</i>
1.1.1 LO	<i>Students will analyze online and offline behaviors in societies (e.g., themselves, peers, families, communities, and countries) and deduce the values that govern these behaviors.</i>		
1.1.1a EK	<i>Societies are groups of individuals characterized by common interests/values that are perpetuated by persistent social interaction.</i>		

Guideline description

Knowledge Unit identifier

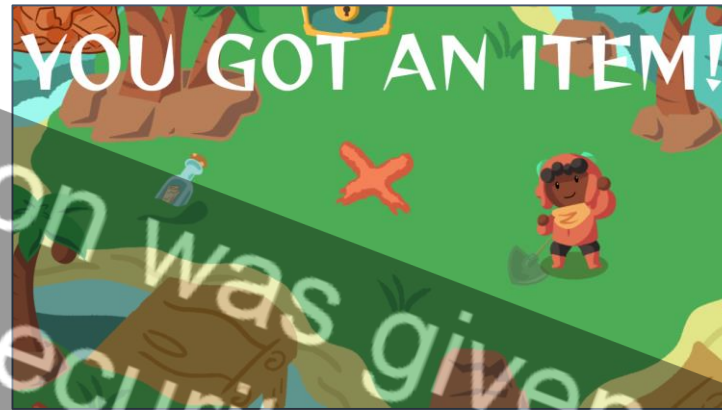
Topic description

This presentation was given at the 2023 National Cybersecurity Education Colloquium

Curriculum Package

Lesson Plans & Instructor Slides

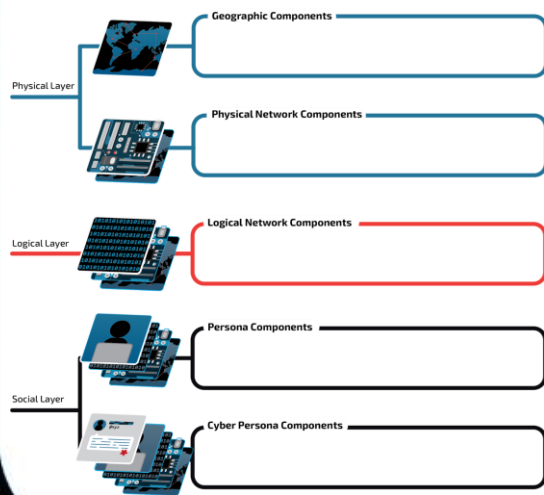
Labs & Games



Visually-Rich Content

Physical Layer	Logical Layer	Social Layer
Geographic Components 	Logical Network Components 	Persona Components
Physical Network Components 		Cyber Persona Components

Graphic Organizers



Name: _____ Date: _____ Period/Block: _____

Classify the CIA Triad (Print)

Objective: I can categorize the CIA Triad.

Part 1: Drag-and-drop each part of the CIA Triad to match the scenario.

Confidentiality	Integrity	Availability

1. Fraudulent dollar bills.

Which part of the Triad does this scenario VIOLATE?

2. Glasses with a built-in microphone.

Which part of the Triad does this scenario VIOLATE?

3. A cell phone signal jammer.

Which part of the Triad does this scenario VIOLATE?

Assessments

Name: _____ Class: _____ Date: _____ ID: A

Unit 11 Authentication and Identity Management

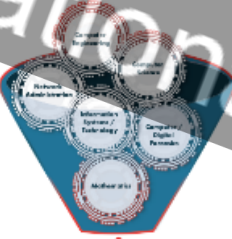
Multiple Choice
Identify the choice that best completes the statement or answers the question.

- This ties behavior to a specific user.
 - password
 - username
 - least privilege
 - multi-factor
- Which of the following is NOT a way to authenticate a user?
 - Something the user knows
 - Someone the user knows
 - Something the user is
 - Something the user has
- Which of the following is something the user does?
 - smartcard
 - fingerprint
 - signature recognition
 - retinal scan
- Which of the following is NOT a good password strategy?
 - Making a good password and using it
 - Having a password that is complex over and over
 - Having a password that is easy to remember but difficult to guess
 - Making a unique password for each account
- Which of the following is NOT a factor in password strength?
 - length
 - type of account
 - complexity
 - unpredictability
- Simone finds a briefcase that has a lock that is three numbers long (_____) what is the maximum number of tries it would take her to find the correct combination of the lock?
 - 10
 - 100
 - 1,000
 - 10,000
- Which password would take the longest to crack?
 - 123456
 - T@ke1T
 - apple1
 - qwerty
- Which of the following is an example of good password security?
 - changing passwords often
 - sharing your password with only your best friend
 - hiding the password underneath the keyboard
 - keeping your password the same as the default password

Data Application	End user layer: program opens	HTTP, FTP, DNS, Telnet		Software
Data Presentation	Syntax Layer: Encrypt / Decrypt	SSH, IMAP, JPEG, MPEG		
Data Session	Sync & Send: Interhost communication	SQL, PAP, APIs, Sockets		Hardware
Segments Transport	TCP & Flow Control: Communication & Reliability	TCP, UDP		
Packets Network	Packets: Path Determination & IP Addressing	IPv4, IPv6, IPsec, ICMP, IGMP		
Frames Data Link	Frames: MAC & LLC (Physical) Addressing	Ethernet, ARP, STP, PPP		
Bits Physical	Physical Structure: Media, Signal, & Digital Transmission	Coax, Fiber, Wireless		

RING Canvas

RING Modules

 <p>Cybersecurity Career</p> <p>Unit 0: Introduction</p> <p>Content List</p>	 <p>Unit 1: Ethics</p> <p>Content List</p>	 <p>Unit 2: Establishing Trust</p> <p>Content List</p>	 <p>Unit 3: Ubiquitous Connectivity</p> <p>Content List</p>	 <p>Unit 4: Data Security</p> <p>Content List</p>
 <p>Unit 5: Introduction to Python Programming</p> <p>Content List</p>	 <p>Unit 6: System Security</p> <p>Content List</p>	 <p>Unit 7: Adversarial Thinking</p> <p>Content List</p>	 <p>Unit 8: Risk</p> <p>Content List</p>	 <p>Unit 9: Implications</p> <p>Content List</p>

Labs and Games

Labs provide hands-on learning through an online portal.

Games map to Big Ideas that drive the primary learning objectives.



Name: _____
Date: _____
Period/Block: _____



Asymmetric Practice

Objectives:

Explain the relationship between public and private keys in asymmetric cryptography.
Apply an asymmetric cryptographic tool to accomplish confidentiality and integrity in a practical scenario.

Overview

RSA is a popular algorithm used for asymmetric cryptography. It can be used to generate public-private key pairs and both encrypt and decrypt information. You will explore RSA using a simple online tool to encrypt a message to your partner. In a future assignment, we will install and use a more realistic version of RSA.

Setup

1. This is a paired activity. Grab a partner and work together!
2. Both you and your partner visit the website: <https://www.javainuse.com/rsagenerator>
(Note: if the website is down, use the backup site: <https://www.codeusingjava.com/tools/rsa>)
3. You and your partner will need a way to copy and paste data back and forth (e.g., Zoom, Slack, email).

1. Key Generation

You and your partner will each generate your RSA public and private keys: click **Generate Keys**.

RSA Generate Keys

This tool generates RSA public key as well as the private key of sizes - 512 bit, 1024 bit, 2048 bit, 3072 bit and 4096 bit with Base64 encoded. The generated private key is generated in PKCS#8 format and the generated public key is generated in X.509 format.

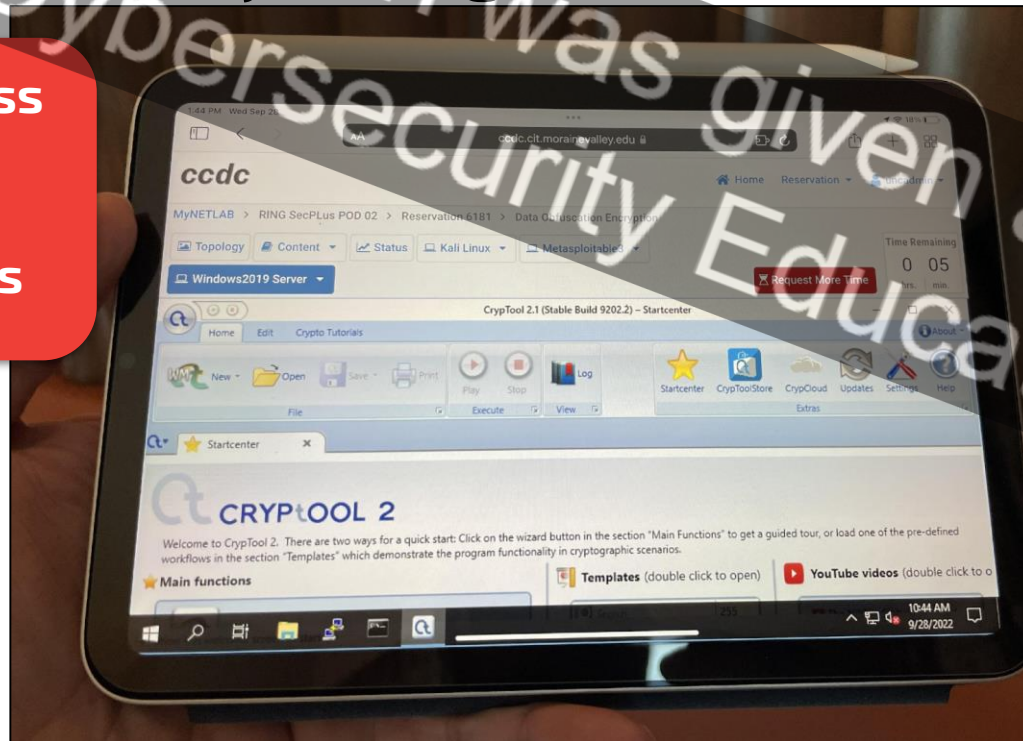
Lab Access

Netlabs offer virtual machines on any device.

Coastline Community College hosts Netlab

RING Netlab Access

- 19 teachers
- 13 states
- 364 students



Competency Lab 3 – Hashing, Encryption, and Password Cracking

After your excellent work on the network, the agency is loaning you to help law enforcement to take down a ransomware group. As part of the sting operation, we have to send the file 'Meeting' from the StingOps folder located on Kali Linux desktop. We suspect that the group will try to change the contents of the message in-transit so your job is to make sure our agent inside has a way to verify the integrity of the document he receives.

1. Produce text file 'HASH' that can be sent via secure channel for verification purposes. Please make sure the file ONLY contain the SHA256 hash of the secret file (i.e., get rid of the file's name). Take a screenshot of the open HASH file.

Command: sha256sum <filename> | awk '{print \$1}' > HASH

```
student@kali-lite:~/Desktop/StingOps$ sha256sum Meeting | awk '{print $1}' > HASH
student@kali-lite:~/Desktop/StingOps$
1f3e5a337598f4e7979288cc78e2626a9474a76841492c2365de533134efdb860
```

2. Count the number of characters in the HASH file. Is the number correct? Why?

Command: wc -m HASH

```
student@kali-lite:~/Desktop/StingOps$ wc -m HASH
64 HASH
student@kali-lite:~/Desktop/StingOps$
```

YES
SHA256 create 64-character hash

Excellent job. We sent the document and our agent already replied. For security purposes he used the polyinstantiation strategy and sent multiple documents as part of the package. The documents, along with the hash file Verification we received through secure channel were saved to Reply folder on the Linux Kali desktop. We need your help to detect the correct document.

3. Please identify the correct document.

Command: sha256sum <file(s)> >> Candidates OR find -type f -exec sha256sum {}; > Candidates
grep -f <sent_hash_file> Candidates

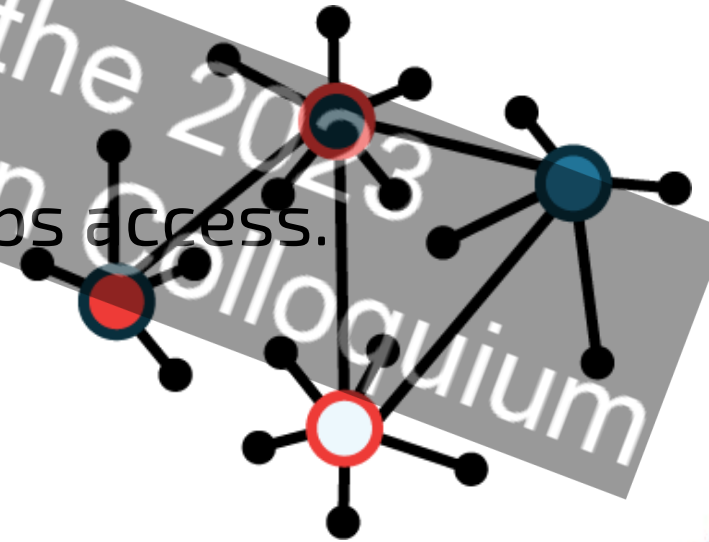
GenCyber Netlabs 2023

205 extra Netlabs seats distributed to GenCyber camps summer 2023.

UAH pilot tested Netlabs as a GenCyber camp activity (deaf/hard-of-hearing and teacher camps).

Four first-year GenCyber camps received Netlabs access.

- Cochise College
- University of Southern Mississippi
- University of North Florida



Student Handbook

- Introduction
- Program Overview
- Academic Calendar
- FAQ
- Cyber Code of Ethics Pledge
- Student Org Overview

2023-2024 Academic Calendar

August 2023							September 2023							October 2023						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4	5					1	2							
6	7	8	9	10	11	12		3	4	5	6	7	8	9	10	11	12	13	14	15
13	14	15	16	17	18	19		16	17	18	19	20	21	22	23					
20	21	22	23	24	25	26		24	25	26	27	28	29	30						
27	28	29	30	31																
November 2023							December 2023							January 2024						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
			1	2	3	4	5	6	7	8	9			1	2					
5	6	7	8	9	10	11		10	11	12	13	14	15	16	17	18	19	20	21	22
12	13	14	15	16	17	18		17	18	19	20	21	22	23	24	25	26	27	28	29
19	20	21	22	23	24	25		24	25	26	27	28	29	30						
26	27	28	29	30				31												
February 2024							March 2024							April 2024						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
4	5	6	7	8	9	10		10	11	12	13	14	15	16	17	18	19	20	21	22
11	12	13	14	15	16	17		17	18	19	20	21	22	23	24	25	26	27	28	29
18	19	20	21	22	23	24		24	25	26	27	28	29	30						
25	26	27	28	29				31												
May 2024							June 2024							July 2024						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
				1	2	3	4						1							
5	6	7	8	9	10	11		2	3	4	5	6	7	8	9	10	11	12	13	14
12	13	14	15	16	17	18		9	10	11	12	13	14	15	16	17	18	19	20	21
19	20	21	22	23	24	25		16	17	18	19	20	21	22	23	24	25	26	27	28
26	27	28	29	30	31			23	24	25	26	27	28	29						

IMPORTANT DATES

Please note that your instructor will provide additional information about your class schedule, including dates for fall and spring break.

CLASS START/END DATES

August 14 Classes begin
December 20 Classes end (last day of Fall 2023 course)
January 3 Classes begin (first day of Spring 2024 course)
May 24 Classes end

OBSERVED HOLIDAYS

September 4 Labor Day
November 23 & 24 Thanksgiving
December 21, 2023 – January 2, 2024 Winter Break
January 15 MLK Holiday
May 27 Memorial Day
June 19 Juneteenth Holiday
July 4 Independence Day Holiday



RING | REGIONS INVESTING IN THE NEXT GENERATION



Please join us!
Parent/Teacher Meet and Greet
Monday, August 28
4pm – 4:30pm (CST)
Zoom link:
<https://ualr-casystem.zoom.us/j/8331832322>

This is your opportunity to meet our RING teachers, student counselor, and Student Org advisor!
The session will be recorded for those who aren't able to attend live.

Course Layout and

- Asynchronous online classes
- Credentialed teachers
- Assignments and lectures are grouped by week
- Parent info sessions / contact
- Frequent student contact
 - Monday missing work reminders
 - Synchronous test review sessions
 - Personalized positive emails

100% of students who completed an end-of-semester survey reported a score of 3 or above on the statement: "The class is organized in a way that I always know what is expected of me and can find all materials and resources easily."

Week of December 9 - December 13, 2022

Announcements

- Quick Access:
 - [NetLab Info](#)
 - [Guest Speaker Recordings](#)
 - [RING Student Org Information](#)
- There will be no class on January 16th.

[CLICK TO MAKE AN OFFICE HOURS APPOINTMENT](#)

[Unit 5: Introduction to Python Programming.](#)

[Optional For Fun Discussion Post: A Day in the \(Not\) Life](#)

[Monday \(1/13\)](#)

- [Activity: User-Defined Functions](#)

[Tuesday \(1/14\)](#)

- Lecture only

[Wednesday \(1/15\)](#)

- [Activity: Truth Table Sort](#)
- [Activity: Nested Conditionals](#)

[Thursday \(1/16\)](#)

- Lecture only

[Friday \(1/17\)](#)

- [Activity: Loops](#)



Curriculum Update - July

Released July 2023



- Assessments
 - Built-in standard mappings
 - Additional questions
 - Test study guides
 - Improvements based on statistical item analysis of student performance
- Updated slide decks
- Updated lesson plans
- Modified/improved materials throughout the curriculum

RING Cybersecurity Curriculum Changes Summer 2023

Overview of Changes:

- All slide decks, both Instructor and Student copies have new links. This means that old slide links will no longer be functional.
- All lesson plans have new links. Old versions of lesson plans have been removed and are no longer accessible.
- Tests and test banks have been improved to have standard mappings, additional questions, and improvements based on a statistical item analysis of student performance.
- Study Guides have been added for all tests

If you previously have been utilizing an export of the course (such as an .imsc file), **it is now out of date**. If a new file of the course is needed, please reach out to ring@caecommunity.org to request the updated version.

Unit 0: Introduction to Cybersecurity

- New slide decks and lesson plans
- Small modifications in Instructor Notes and Lesson Plans
- Removed sample outline. Please refer to the Lesson Plans for a suggested pacing.

Unit 1: Ethics

- New slide decks and lesson plans
- Added legend for the Risk Matrix
- Removed sample outline. Please refer to the Lesson Plans for a suggested pacing.

Unit 2: Establishing Trust

- New slide decks and lesson plans
- Small modifications in Instructor Notes and Lesson Plans
- Updated Scytale Resource
- Minor updates for clarity in Activity: Classify the CIA Triad

Unit 3: Ubiquitous Connectivity

- New slide decks and lesson plans
- Recreated and updated Graphic Organizer: Dark Side of the Web

Unit 4: Data Security

- New slide decks and lesson plans
- Significant modifications in Instructor Notes and Lesson Plans in order to ensure clarity of content
- Added discussion of FERPA

Teach with RING!

Teacher
Curriculum
Request Form



Educators* can gain full access to the curriculum package

- All Units available
- Gain access to virtual labs
- RING Student Org events
- Provide feedback

*Educators who request access must provide proof of their school/homeschool affiliation.



RING Teachers Nationwide

Over 550 educators across the nation are using the RING curriculum at no cost.

“As a CTE high school teacher who has been in education for over 20 years, I have to say that I am so impressed with this curriculum. The content, integration with Google for Education tools, and the sequencing are completely on point.”

-KY Public School Teacher

RING Teachers Nationwide

This presentation was given at the National Cybersecurity Education Colloquium 2023



Demographics

Instructor Responses

Under-resourced

30.4%

Homeschool

1.5%

Rural

26.1%

No courses offered

42.0%

350 instructors indicated they are using RING to supplement or replace their curriculum.

This presentation was given at the 2023 National Cybersecurity Education Colloquium

RING Teacher Training

- 102-page handbook designed for week-long teacher training
 - Unit overviews
 - Vocabulary
 - Activity practice
 - Lab practice
- Teacher trainings held at:
 - Hawaii EPI Summit (12 teachers)
 - Nebraska Education Innovation Summit (3 teachers)
 - Puerto Rico EPI Summit (13 teachers)
 - UAH Virtual Teacher Outreach (2

Table of Contents

Unit 0: Introduction to Cybersecurity

- Unit 0: Overview
- Vocabulary
- Activity Practice: EXIF Extraction

Unit 1: Ethics

- Unit 1 Overview
- Unit 1 Vocabulary
- Activity Practice: How Organizations Use Collected Data
- Cyber Code of Ethics Pledge

Unit 2: Establishing Trust

- Unit 2 Overview
- Unit 2 Vocabulary
- Activity Practice: Caesar Cipher

Unit 3: Ubiquitous Connectivity

- Unit 3 Overview
- Unit 3 Vocabulary
- Lab Practice: Netstat

Unit 4: Data Security

- Unit 4 Overview
- Unit 4 Vocabulary
- Activity Practice: Asymmetric Practice

Unit 5: Introduction to Python Programming

- Unit 5 Overview
- Unit 5 Vocabulary
- Lab Practice: Guide the Turtle

Unit 6: System Security

- Unit 6 Overview
- Unit 6 Vocabulary
- Practice: Buffer Overflow Lab

Unit 7: Adversarial Thinking

- Unit 7 Overview
- Unit 7 Vocabulary
- Activity Practice: Pwnd

Unit 8: Risk

- Unit 8 Overview
- Unit 8 Vocabulary
- Lab Practice: The Dangers of XSS

Unit 9: Implications

- Unit 9 Overview
- Unit 9 Vocabulary
- Activity Practice: Birth of the Internet

Industry-Backed Training

Teachers

- AL: 27
- TN: 4
- GA: 18
- KY: 3
- MS: 2
- NC: 9
- VA: 14



REGIONS INVESTING IN
THE NEXT GENERATION



Enroll Students in RING!

Option 1: Fall 2023 (single semester) Enroll in the RING course from August 2023 through December 2023.

Option 2: Academic Year (2023-2024) Enroll in the RING course from August 2023 through May 2024.

RING Website:
caecommunity.org/initiative/k12-ring

May 2024.

**Student
Enrollment
Request Form**



RING Centralized Course

155 students across the nation are enrolled in RING or have completed the course through the centralized program.

- Pilot course: 14 students completed
- 2022-2023: 31 students
- Spring 2023: 19 students
- Summer 2023: 18 students
- 2023-2024: 68 students are currently enrolled
- Fall 2023: 5 students are currently enrolled

RING Centralized Course

"I just like it so much I can't stop myself from looking up more about the topic...this is probably my favorite class this year."
-RING Pilot Student



Demographics

Student Responses

Under-resourced

9.7%

Homeschool

19.4%

Rural

16.7%



Note that students and parents are self-reporting.

This presentation was given at the 2023 National Cybersecurity Education Colloquium

RING Participants by

Southwest Regional Hub

- 41 Instructors
- 42 Central Students

Northwest Regional Hub

- 63 Instructors
- 2 Central Students

Midwest Regional Hub

- 103 Instructors
- 16 Central Students

Northeast Regional Hub

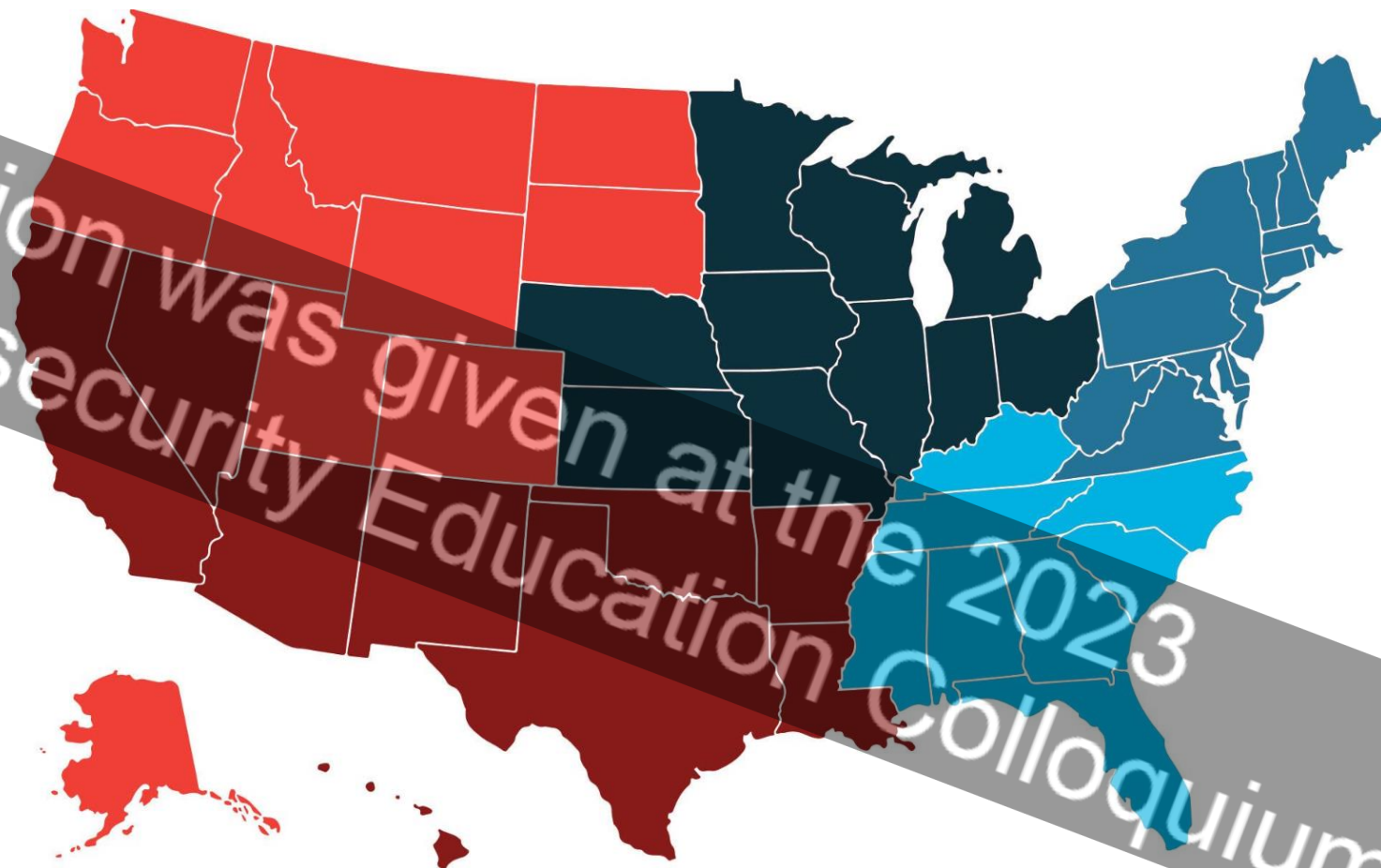
- 81 Instructors
- 31 Central Students

Southeast Regional Hub

- 134 Instructors
- 42 Central Students

Puerto Rico

- 20 Instructors
- 6 Central Students



*as of August 2023

RING Student Org

The RING Student Org is available to students in all RING courses.

EPIs, institutions, and schools are encouraged to adopt the RING Student Org bylaws, duties, and responsibilities and create local chapters.

The central organization...

- Hosts events and leaderboards
- Facilitates Discord discussion
- Advertises news, internships, scholarships, camps, opportunities



NICE Work Roles

NICE Work Roles are highlighted through RING student org events, guest presenters, and



Systems Security Analyst RING 1




Northrup Grumman **Romell Foster**

Sr. Cyber System Engineer

IT Security While working for Jacobs Technology, Romell found a passion for Information Technology and Security.

Program Manager RING 2



UAH CCRE **Jesse Hairston**

Assistant Director

Certified Ethical Hacker Jesse works to expand cyber education by creating curricula and opportunities that are accessible to new learners.



Pathways: College

TEANECK, NJ



Fairleigh Dickinson University



Degrees Offered:

- Bachelor of Science in **Information Technology**
- Bachelor of Science in **Computer Science**
 - Concentration in Cybersecurity
 - Concentration in Cyber & Information Assurance
- Master of Science in **Cybersecurity & Information Assurance**

Scholarship opportunities:

- Department of Defense **Cyber Scholarship Program (CySP)**

Who's hiring?

- UPS
- Department of Defense
- State Law Enforcement

For more information, contact Dr. Kaylan Mondal, mondal@fdu.edu



MAUI, HI



University of Hawaii, Maui College



Degrees Offered:

- Bachelor of Applied Science in Applied Business and Information Technology (ABIT)

Who's hiring?

- Local small and medium-sized businesses
 - Help desk
 - Business Analyst
 - Systems Analyst

For more information, contact: Debases Bhattacharya at debasieb@hawaii.edu

RING Style Guide

RING Logo

The RING logo must be present on every piece of RING media and content.

Primary Logo

RING's primary logo should be used when possible. The variant logo can be used when the use of the primary logo is not feasible due to size restraints or because of certain aesthetic choices.



Variant Logo

RING's variant logo without the 'Regions Investing In The Next Generation' can be used when needed.



White Logos

White versions of the logos can be used when needed, such as when the logo is placed on a dark background.



RING STYLE GUIDE | 1

RING Logo Usage

DO

Do use the white version of a logo on darker backgrounds.



Do make sure that the RING logo is at least 1 inch tall, and that there is a half-inch of blank space on all sides of the logo.

Do place the logo on a plain, high-contrast background. Do keep RING's colors in mind.



Do use all-white or all-black versions of the RING logo when necessary.



RING STYLE GUIDE | 3

RING's Color Palette

RING Colors

RING content and media must try to adhere to the color palette as much as possible. Red should be used as an accent color when necessary. Shades of gray may be used as needed to complement the official colors below.


HEX	CMYK	PANTONE
#002F3D	C: 95.83 M: 69.07 Y: 53.24 K: 53.86	547 C
#247396	C: 85.79 M: 47.2 Y: 26.43 K: 3.94	7698 C
#BE1E2D	C: 15 M: 100 Y: 90 K: 10	1795 C
#EF3F37	C: 0 M: 90.79 Y: 84.27 K: 0	Warm Red C
#ECF7FD	C: 6.19 M: 0 Y: 0.3 K: 0	656 C



RING STYLE GUIDE | 4

RING Promotional

Unlock Your Potential



"I just like it so much I can't stop myself from looking up more about the topic...this is probably my favorite class this year." RING Pilot Course Student

"This class was amazing!" RING 2022-2023 Student

"This class changed the way I understand cybersecurity. I know a lot more than I did before taking the class." RING 2022-2023 Student

What Is RING?

RING (Regions Investing in the Next Generation) is an online high school cybersecurity curriculum available for educators to use at no cost. Its goal is to bring cyber to high school students who don't have access to a cybersecurity program, especially students in rural areas, homeschooled students, and students attending under-resourced schools.

- RING is provided at no cost through NSA CAE-C K12 Pathway grants.
- Students can achieve high school credit.
- Students can engage with each other through the RING Student Organization.

2023-2024 High School Academic Year (2023-2024)

Enroll in the program for the full academic year. Recommended for most students.

Fall 2023 (single semester) Enroll in the program for the fall semester. The shorter timeframe of this fast-paced course.


Spring 2024 (single semester) Enroll in the program for the spring semester. The shorter timeframe of this fast-paced course.

How to Enroll

High school students can enroll through the **Student Enrollment Request Form**.



Teach with RING!



What Is RING?

RING (Regions Investing in the Next Generation) is an online high school cybersecurity curriculum available for educators to use at no cost. Its goal is to bring cyber to high school students who don't have access to a cybersecurity program, especially students in rural areas, homeschooled students, and students attending under-resourced schools.

RING will equip you with the resources and materials you need to introduce your students to cybersecurity and prepare them for college cybersecurity courses.

Key Points


- RING course content is provided at no cost through NSA CAE-C K12 Pathway grants.
- The RING course consists of 180 content hours and includes detailed lesson plans, instructional slides, activities, hands-on labs, graphic organizers, review games, and assessments.
- The RING program offers limited teacher and student accounts for a free cybersecurity range.
- The RING program has an associated honor society and student organization.
- RING has been vetted by Center of Academic Excellence in Cybersecurity (CAE-C) colleges and universities.
- RING has been pilot tested with high school students.

What Is a Center of Academic Excellence in Cybersecurity?

Institutions that receive a CAE-C designation have met the rigorous requirements set forth by the sponsor of the program, the National Security Agency (NSA). The NSA awards CAE-C designations to institutions that commit to producing cybersecurity professionals that will reduce vulnerabilities in our national infrastructure.



Want More Information?

Educators interested in using the RING curriculum or offering a RING course should complete the **RING Curriculum Request Form** found on the website below or by scanning the QR code.





Learn More

Email: ring@caecommunity.org
Website: <https://caecommunity.org/initiative/k12-ring>



WHEN OPPORTUNITY CALLS, ANSWER

CYBER CLASSES FOR HIGH SCHOOL STUDENTS
CYBER RESOURCES FOR EDUCATORS



Contact Info



REGIONS INVESTING IN
THE NEXT GENERATION

ring@caecommunity.org

given at the 2023
Education Colloquium

Educational Pathway Institutions (EPIs)

- **Promote the RING curriculum and education-to-career pathways within the NCAE-C community**
 - Implement RING in local communities and statewide
 - Document student enrollment and progress
- **Work with EPNC to establish RING infrastructure**
 - Meet minimum capacity of 200 students in each state
 - Implement extra-curricular activities (clubs, honor society, career orientation)
 - Provide range access for RING
 - Identify and develop industry partnerships and internships
- **Develop and scale the number of EPIs and students served nationally**
 - Expand capacity of RING participation to 200-700 students per state
 - Expand post-secondary and secondary educational partners per state
 - Expand the number of EPIs nationwide

Defining POS Pathways In Accordance with The (Perkins V) Criteria

Key Elements of Career Pathways	CTE POS 10 Essential Components	Common Features
(1) Build Cross-Agency Partnerships and Clarify Roles	(2) Partnerships	<ul style="list-style-type: none"> • Cross-agency partnerships include education, business, workforce, economic development, and community stakeholders • Common vision and goals • Clearly delineated and agreed-upon roles/responsibilities for all partners
(2) Identify Industry Sectors and Engage Employers	(2) Partnerships (10) Technical Skills Assessment	<ul style="list-style-type: none"> • Both career pathways and career and technical education programs of study frameworks stress the analysis and validation of economic and workforce trends, and adaptation of pathways accordingly
(3) Design Education and Training Programs	(5) College and Career Readiness Standards (6) Course Sequences (7) Credit Transfer Agreements (8) Guidance Counseling and Academic Advising (9) Teaching and Learning Strategies	<ul style="list-style-type: none"> • Clear, non-duplicative sequences of course • Opportunities to earn college credit leading to industry-recognized, postsecondary credentials • Credit transfer / articulation agreements • Counseling, including career planning and academic advisement • Support services, especially in career pathways • Contextualization and modularization of curricula, and mapping of pathways • Integrated instruction of academic and technical content • Instructional strategies that instill work readiness skills

Defining POS Pathways In Accordance with The (Perkins V) Criteria

Key Elements of Career Pathways	CTE POS 10 Essential Components	Common Features
(4) Identify Funding Needs and Sources	(1) Legislation and Policies (3) Professional Development	<ul style="list-style-type: none"> Emphasis on the role of federal, state, and local policies in promoting and sustaining career pathways and programs of study and in helping students access career pathways and programs of study services
(5) Align Policies and Programs	(1) Legislation and Policies	<ul style="list-style-type: none"> Braided or integrated funding from multiple funding sources to provide sufficient resources and sustain programs Importance of funding to support professional development and other system development activities
(6) Measure System Change and Performance	(4) Accountability and Evaluation Systems (10) Technical Skills Assessment	<ul style="list-style-type: none"> Importance of defining outcomes / measuring progress Processes for collecting, storing, analyzing, and sharing data are encouraged in both career pathways and programs of study frameworks

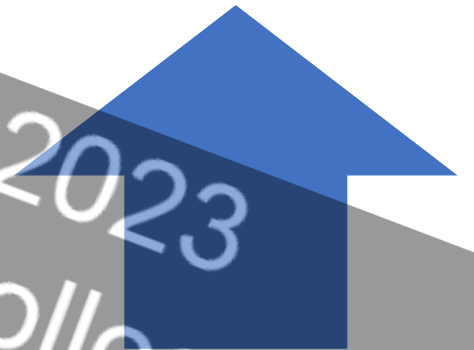
K12 Criteria

CTE POS 10 Essential Components



CAE
Institutions

K12 or HS
Programs



CAE Criteria Committee

Key Elements (6) of Career Pathways

Recognizing POS Pathways

This presentation was given at the 2023 National Cybersecurity Education Colloquium

Collaborations

- GenCyber Student Camps
- GenCyber Teacher Camps
- NICE K12 Conference
- WiCyS Conference



THE
NICE K12
CYBERSECURITY EDUCATION
CONFERENCE



Other Collaborations

- Regional EPIs Symposiums
- Microsoft 21st Century Learning Model
- RING K12 Teachers Academy
- NCyTE Center Fellowship Program
- JROTC Summer Cyber Camps
- CTE CyberNet Program
- UCCS Cybersecurity Teachers Incubator
- Annual EPNC Developers Symposium
- Career Counselors and Academic Advisors Events



EPNC Teaching and Learning Products

- EMATES
- Cryptography Exercises/Activities
- Cybersecurity Games
- 3D/2D VR/ER/AR
- Embedded AI
- Virtual Labs and Lab Environment
- Cybersecurity Case Studies

This presentation was given at the 2023 National Cybersecurity Education Colloquium

EMATE Library

myEMATES

Home Cybersecurity Cryptography CMMC Networking Programming Mathematics Electronics

EMATE Interactives help students learn difficult concepts using animation. EMATES were first developed under the leadership of Mike Qaissaonee at the Brookdale Cyber Center and Dr. John Sands at CSSIA with funding from an NSF Grant (DUE 1601612). Use the interactives to help teach students and to develop their skills in a variety of disciplines.

ETHICS

MATH

BETTER WAY TO LEARN

DIVERSE LEARNING STYLES

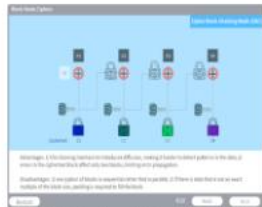
COMPUTER SCIENCE

ENGINEERING



Take a look at the new EMATES created and posted this summer

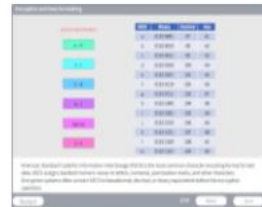
A Cryptography page has been added



Block Mode ciphers used in symmetric encryption algorithms



Digital Signatures



Encryption and Data Formatting



RSA Encryption Algorithm



Factoring and Prime Numbers are the building blocks for asymmetrical encryption algorithms

RSA Encryption Algorithm

We kept our examples simple by using small numbers. Generate some larger prime numbers (1,000-1,999) to use as inputs for RSA keys.

Generate Prime Numbers

1009, 1013, 1019, 1021, 1031, 1033, 1039, 1049, 1051, 1061, 1063, 1069, 1087, 1091, 1093, 1097, 1103, 1109, 1117, 1123, 1129, 1151, 1153, 1163, 1171, 1181, 1187, 1193, 1201, 1213, 1217, 1223, 1229, 1231, 1237, 1249, 1259, 1277, 1279, 1283, 1289, 1291, 1297, 1301, 1303, 1307, 1319, 1321, 1327, 1361, 1367, 1373, 1381, 1399, 1409, 1423, 1427, 1429, 1433, 1439, 1447, 1451, 1453, 1459, 1471, 1483, 1483, 1487, 1489, 1493, 1499, 1511, 1523, 1531, 1543, 1549, 1553, 1559, 1567, 1571, 1579, 1583, 1597, 1601, 1607, 1609, 1613, 1619, 1621, 1627, 1637, 1657, 1663, 1667, 1669, 1693, 1697, 1699, 1709, 1721, 1723, 1733, 1741, 1747, 1753, 1759, 1777, 1783, 1787, 1789, 1801, 1811, 1823, 1831, 1847, 1861, 1867, 1871, 1873, 1877, 1879, 1889, 1901, 1907, 1913, 1931, 1933, 1949, 1951, 1973, 1979, 1987, 1993, 1997, 1999

RSA Key Generation

Prime Number 1 (p):

Prime Number 2 (q):

Generate RSA Keys

Results:

Prime Number 1:

Prime Number 2:

N:

Euler Totient:

Encryption (E):

Decryption (D):

Key Generation Calculator

IPv6 Challenge

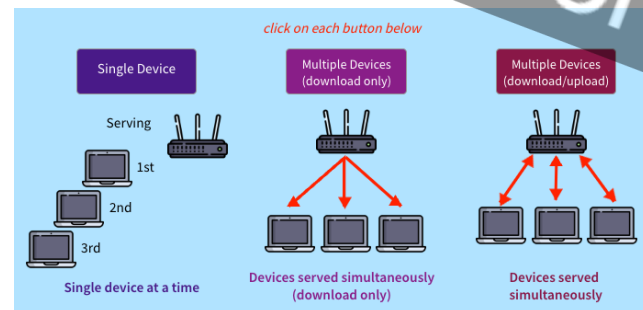
First Rule: Omit leading zeros

0008:00f8:100d:09d0:b030:d301:0050:00ef

Cryptography Exercises/Activities

- Classical Cryptography
- Modern Cryptography
- Symmetrical Encryption
- Asymmetrical Encryption
- Hashing
- Steganography
- Digital Certificates
- Digital Signatures
- PKI
- Cryptoanalysis

The image shows two software interfaces. On the left is the 'Enigma Enigma' simulator, displaying rotor positions (I, A, II, A, III, R) and a complex wiring diagram. On the right is an 'IP Addressing: Binary to Decimal' converter. It features a grid of 32 red switches, each with 'ON' and 'OFF' labels. Below the switches, a binary sequence '1 1 0 0 0 0 0 0 0 0 1 0 1 0 1 0 0 0 0 0 1 0 0 0 0 1 0 0 1 0 1' is shown. Below this, a calculation is performed: $128 \times 64 + 32 \times 16 + 8 \times 4 + 2 \times 1 = 192 + 168 + 20 + 69 = 449$. A link '<< click here to take the quiz >>' is at the bottom right.



The image shows a 'Step by Step Signature Generation' workflow. The steps are: 'Open document' (Document icon), 'Select hash function' (Hash function icon), 'Generate key' (RSA key icon), 'Provide certificate' (Certificate icon), 'Generate signature' (Signature icon), and 'Store signature' (Signature icon). A 'Select a Hash Function' dialog box is open, showing options: MD2, MD4, MD5, SHA, SHA-1, SHA-256, SHA-512, and RIPEMD-160. Below the workflow, a text area shows a document's content in hexadecimal and ASCII: 'Document: startingexample-en.txt' followed by hex values and the ASCII text 'CrypTool (Starting example for the...)'.

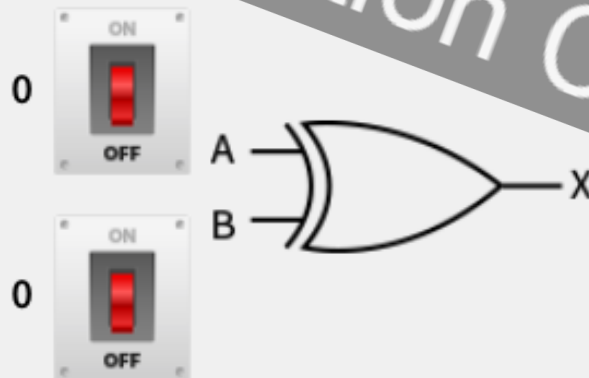


Cybersecurity Games

This presentation was given at the 2023 National Cybersecurity Education Colloquium

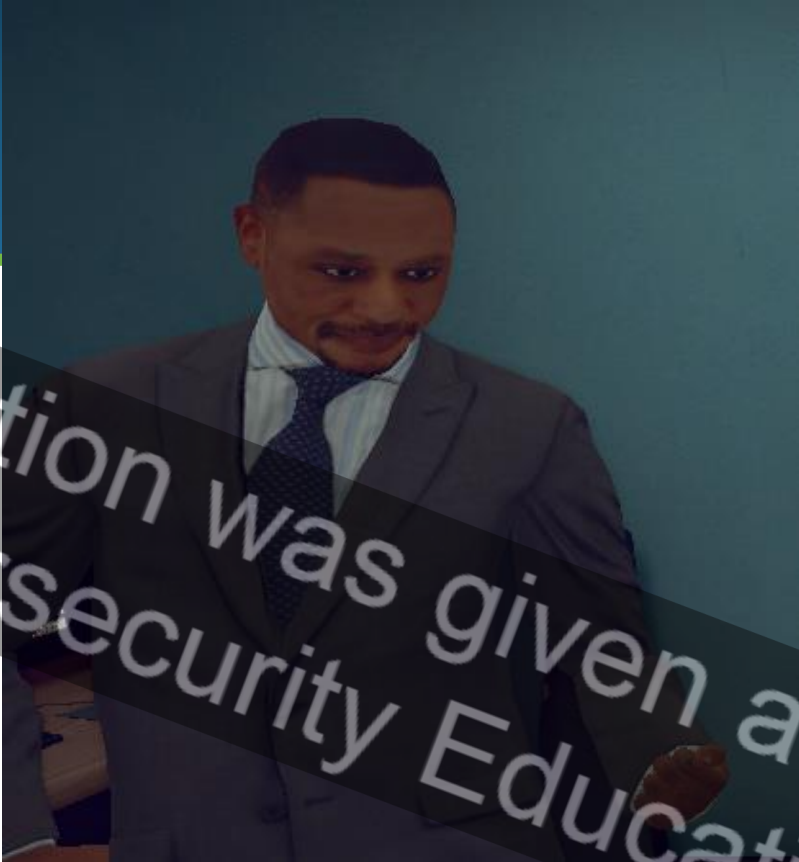
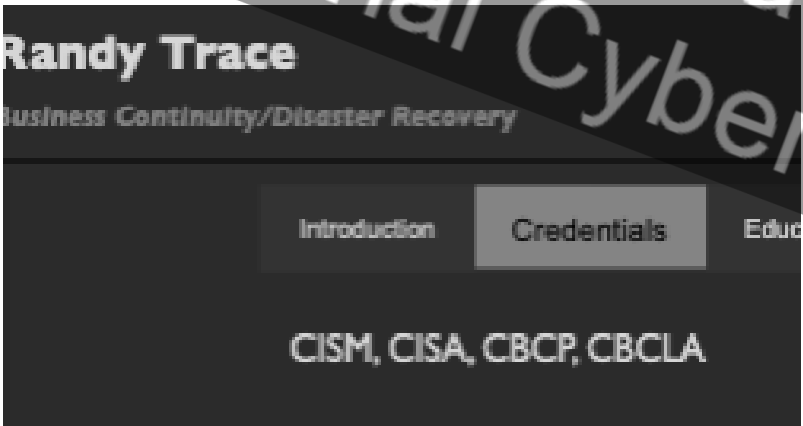
switches on and off

OR



Boolean Expressions
 $X = A \oplus B$

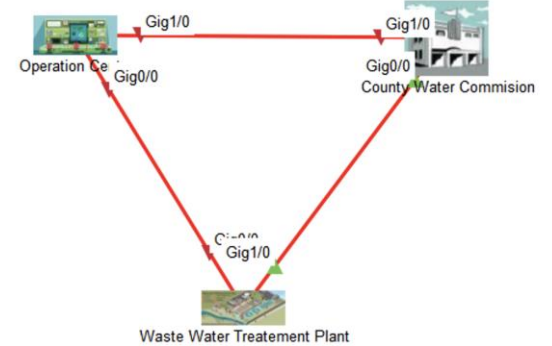
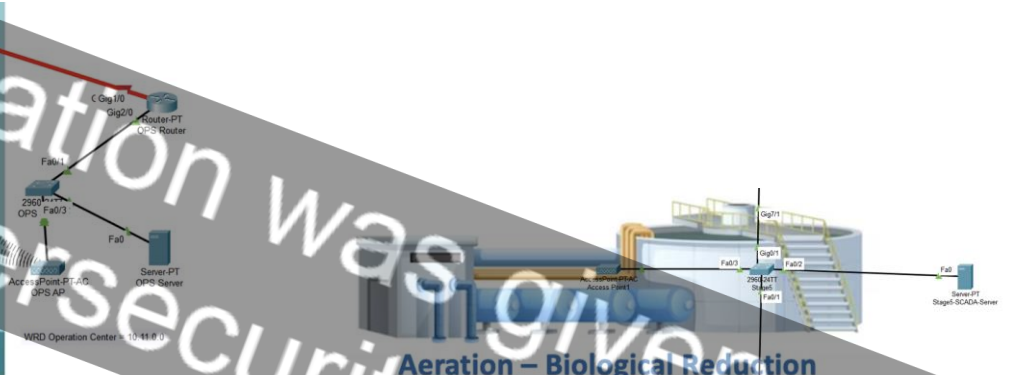
INPUTS		OUTPUT
A	B	X
0	0	0
1	0	1
0	1	1
1	1	0



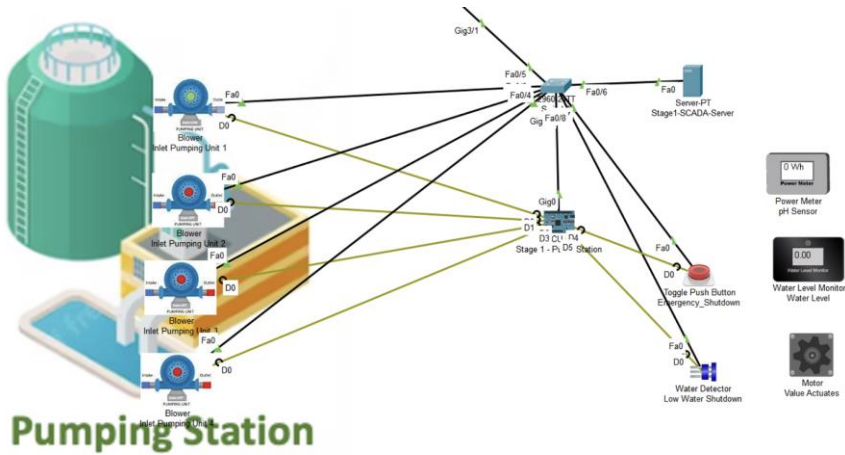
3D/2D VR/ER/AR

This presentation was given at the 2023 National Cybersecurity Education Colloquium

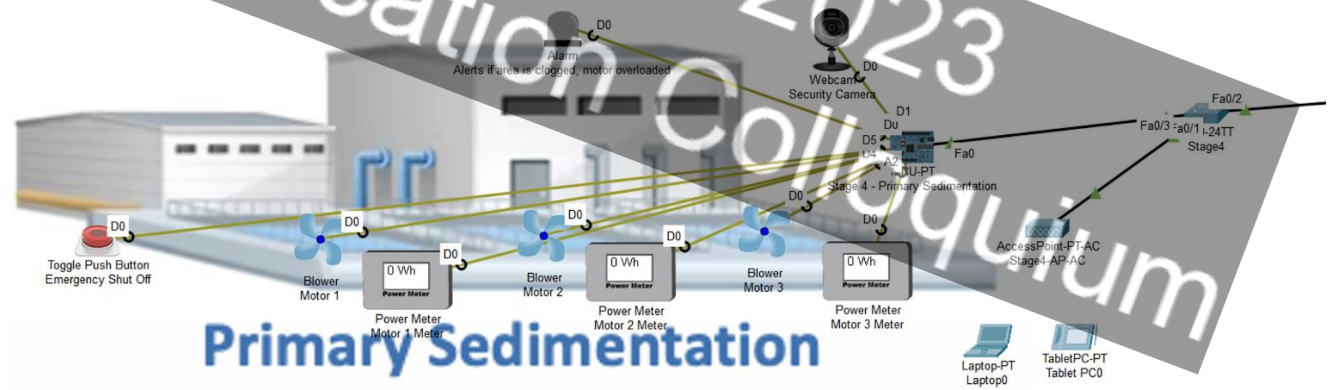
Embedded AI



Aeration - Biological Reduction



Pumping Station



Primary Sedimentation

This presentation was given at the 2023 National Cybersecurity Education Summit at the University of North Carolina at Charlotte

RING Enhancement Labs

- Enhance student engagement and deepen understanding of materials in a safe, fully virtualized environment.
- Real-world scenarios are used to assess the student's knowledge, skills, and abilities.
- Implemented the new NDG environment to enrich the student experience with embedded content and assessments.

- 13 Detailed Labs
- 4 Competency labs



Instructor Guide

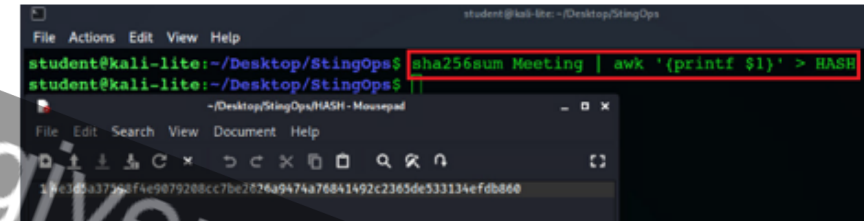
- Instructor guide provides step-by-step instructions and additional resources to solve each challenge.

Competency Lab 3 – Hashing, Encryption, and Password Cracking

After your excellent work on the network, the agency is loaning you to help law enforcement to take down a ransomware group. As part of the sting operation, we have to send the file 'Meeting' from the StingOps folder located on Kali Linux desktop. We suspect that the group will try to change the contents of the message in-transit so your job is to make sure our agent inside has a way to verify the integrity of the document he receives.

1. Produce text file 'HASH' that can be sent via secure channel for verification purposes. Please make sure the file ONLY contain the SHA256 hash of the secret file (i.e., get rid of the file's name). Take a screenshot of the open HASH file.

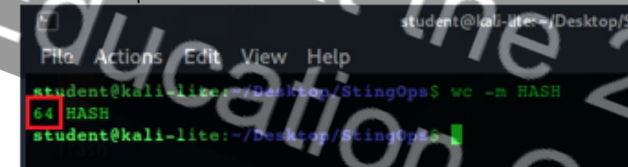
Command: `sha256sum <filename> | awk '{printf $1}' > HASH`



```
student@kali-lite:~/Desktop/StingOps$ sha256sum Meeting | awk '{printf $1}' > HASH
student@kali-lite:~/Desktop/StingOps$
~/Desktop/StingOps/HASH - Mousepad
File Edit Search View Document Help
1 fe3d9a37798f4e9879288cc7be2024a9474a76841492c2365de533134efdb860
```

2. Count the number of characters in the HASH file. Is the number correct? Why?

Command: `wc -m HASH`



```
student@kali-lite:~/Desktop/StingOps$ wc -m HASH
64 HASH
student@kali-lite:~/Desktop/StingOps$
```

YES
SHA256 create 64-character hash

Excellent job. We sent the document and our agent already replied. For security purposes he used the polyinstantiation strategy and sent multiple documents as part of the package. The documents, along with the hash file Verification we received through secure channel were saved to Reply folder on the Linux Kali desktop. We need your help to detect the correct document.

3. Please identify the correct document.

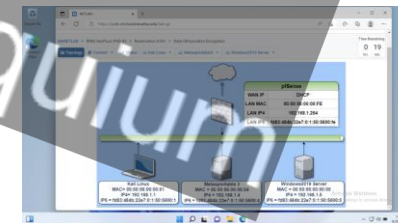
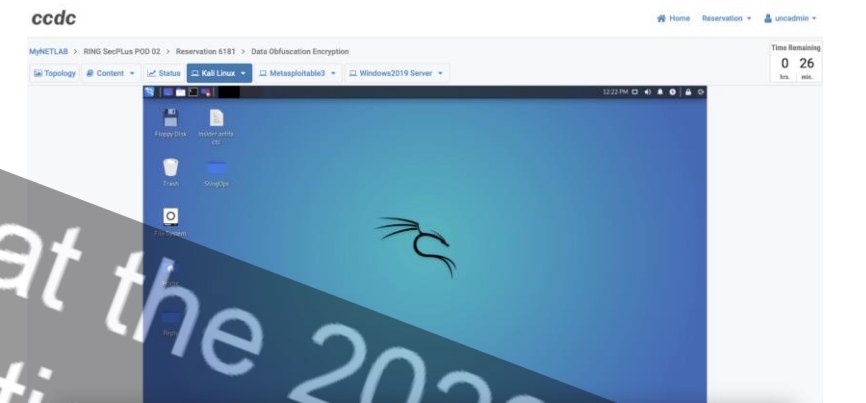
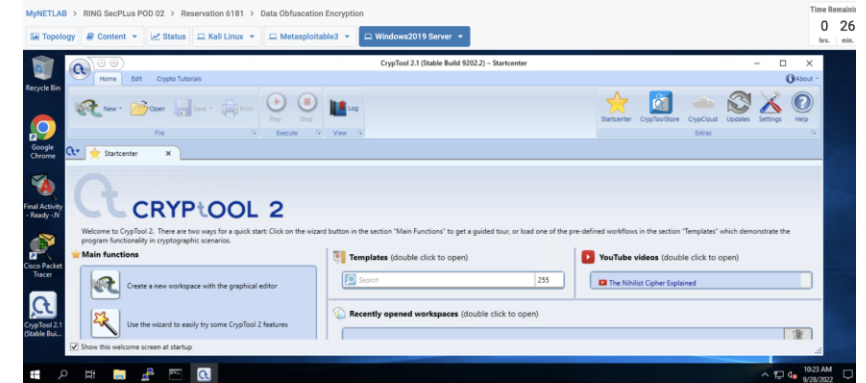
Command: `sha256sum <file(s)> >> Candidates OR find -type f -exec sha256sum {} \; > Candidates
grep -f <sent_hash_file> Candidates`

This presentation was given at the 2023 National Cybersecurity Education Colloquium

Established Range Access Infrastructure



- Over the summer, we ran a test case of 140 students using the lab
- Works with any OS and Mobil Device including Chrome Books and Raspberry Pi's
- Hi processing tools like CrypTool
- We can support this now – 1900 students requesting this 90 teachers.



EPNC Pathways and Programs of Study Services

Outreach and Support Career Counselors and Academic Advisors

Faculty Development Academy

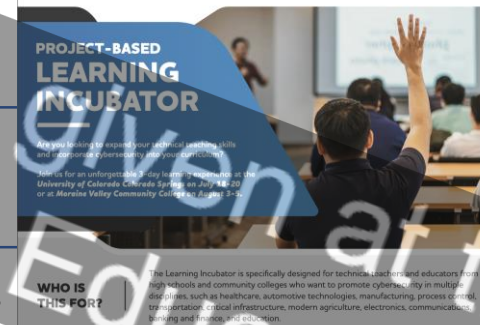
Cybersecurity Incubator

Model Dual Credit / Dual Enrollment


Attracting New Cybersecurity Faculty

Access to Virtual Environment

Alignment to Perkins V Requirements



EPNC **RING** **REGISTER HERE**

Register Here: tinyurl.com/RINGNCEC 

RING CYBERSECURITY FACULTY WORKSHOP

at the National Cybersecurity Education Colloquium

September 22, 2023 • 8:30am - 3:00pm CDT • In-Person

Workshop Activities

- **Interactive Lectures:** Our expert instructors employ interactive techniques, labs, animations, videos, team projects, and more to guide you through cybersecurity concepts efficiently.
- **Hands-on Exercises:** Gain instructor-level privileges in the RING virtual teaching and learning environment, empowering your students with access to the virtual platform for practical learning.
- **Peer Collaboration:** Connect with fellow faculty members, sharing experiences and fostering a strong community of cybersecurity educators through ample collaboration opportunities.
- **Q&A Sessions:** Our instructors are readily available during the workshop to address your queries, ensuring a comprehensive understanding of the course material.

About The Workshop

Cybersecurity is an increasingly important topic in today's digital world, and it's essential that faculty are equipped with the knowledge and skills to effectively teach this subject. The RING team has developed a curriculum that aligns to popular industry certifications (Security+). The curriculum also aligns to the NSA CAE Program KUs which will enable high school programs to easily articulate to college CAE programs. That's why we're excited to offer this workshop, designed specifically for faculty who will be teaching cybersecurity at the high school level.

By participating in this workshop, you'll gain a deep understanding of cybersecurity and be better equipped to teach cybersecurity. You will also be able to network with other faculty members and form lasting connections that can benefit you and your students for years to come.

Don't miss out on this opportunity to enhance your teaching skills and deepen your understanding of cybersecurity. Register now for the RING Cybersecurity Faculty Workshop!

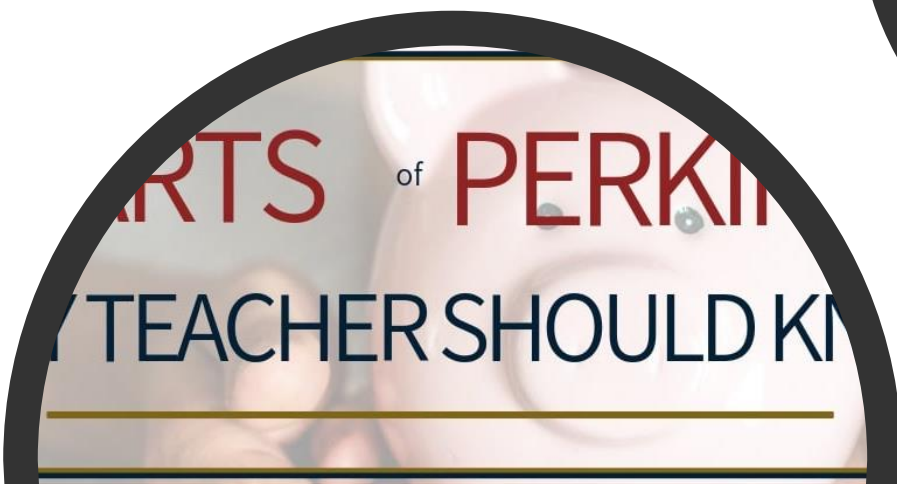
Join our Education Pathway Institutions (EPIs) for our 1-day, 6-hour in-person synchronous workshop from 8:30am to 3:00pm CDT.

Dual Credit / Dual Enrollment Models

- Helping Schools Relevant Dual Credit Programs
- Promoting Rigorous Content
- Promoting Diversity and Equity
- Improving Teaching and Learning
- Aligning to Perkins V Dual Credit Program Requirements



Course ID	NET 105 ITF	CYB 101 Career Orination	NET 111 Hardware A+	NET121 Computer Networkin	NET 280 IT Security+
Security Foundations (CSF)					
Content of the Cybersecurity Foundations Knowledge Unit is to provide students with a basic understanding of the fundamental concepts behind cybersecurity. This is a high level overview or familiarization of the Topics, not a deep dive into specifics.					
Stand Outcomes					
Complete this KU, students should be able to:					
Understand the fundamental concepts of the cybersecurity discipline and use to provide security.					✓
Identify potential system attacks and the actors that might perform them.					✓
Apply cyber defense tools, methods and components and apply cyber defense methods to a system to repel attacks.					✓
Identify appropriate measures to be taken should a system compromise occur.					✓
Recall the Vocabulary associated with cybersecurity.	✓			✓	✓
All Topics and sub-Topics must be completed					
(threat actors, malware, natural phenomena)	✓				✓
Disaster Management (include backups and recovery)	✓				
	✓				
(including)					
(Brewer Nash, Multi-level security)					



Range Access and Support

- Training

- Provide Training of the Virtual Lab Environment

- Tracking

- Centralized website to direct future RING users. This will also identify users that will require training before accessing the material.

The screenshot shows a web interface for managing lab reservations. At the top, there is a section titled "Scheduled Lab Reservations" with a calendar icon. Below this, a light blue box contains the text: "You have no scheduled lab reservations. Select from the Schedule menu above to add reservations." Below the blue box is a blue button labeled "New Lab Reservation" with a dropdown arrow. A dropdown menu is open, showing five options: "View or Cancel Lab Reservations" (with an eye icon), "Schedule Instructor-Led Training" (with a red paw print icon), "Schedule Lab for Myself" (with a person icon), "Schedule Lab for a Student" (with a person icon), and "Schedule Lab for a Team" (with a group of people icon).



REGIONS INVESTING IN
THE NEXT GENERATION

This presentation was given at the 2023 National Cybersecurity Education Colloquium

Branding Logo Options

DNS Domains

<https://myemates.org>

<https://myemates.net>

<https://epnc.org>

<https://epnc.org>

<https://cae-epnc.org>

<https://cae-epnc.org>



EDUCATION PATHWAY NATIONAL CENTER

This presentation was given at the 2023 National Cybersecurity Education Colloquium



NCAE-C Education Pathway National Center

Questions / Comments ?