Dr. John Sands

PI, Education Pathway National Center

Moraine Valley Community College

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EPNC Team

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University of Hawaii-Maui

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Fairleigh Dickinson University,
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Dakota State University DSU

Laura Henry
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Dr. Alfredo Cruz
Polytechnic University of
Puerto Rico

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)

5 EPIs


This presentation was given at the 2023
National Cybersecurity Education Colloquium

RING Update

UAH RING Curriculum

Jesse Hairston
RING Director

Tania Williams
Pedagogical Expert

Katherine MacGilvray
Program Coordinator

Ashley Mahoney
Student Org. Coord.

Karen Brown
RING Counselor

Anna Rodgers
RING Teacher

Amelia Adkins
RING Teacher

Benjamin Cummins
RING Teacher

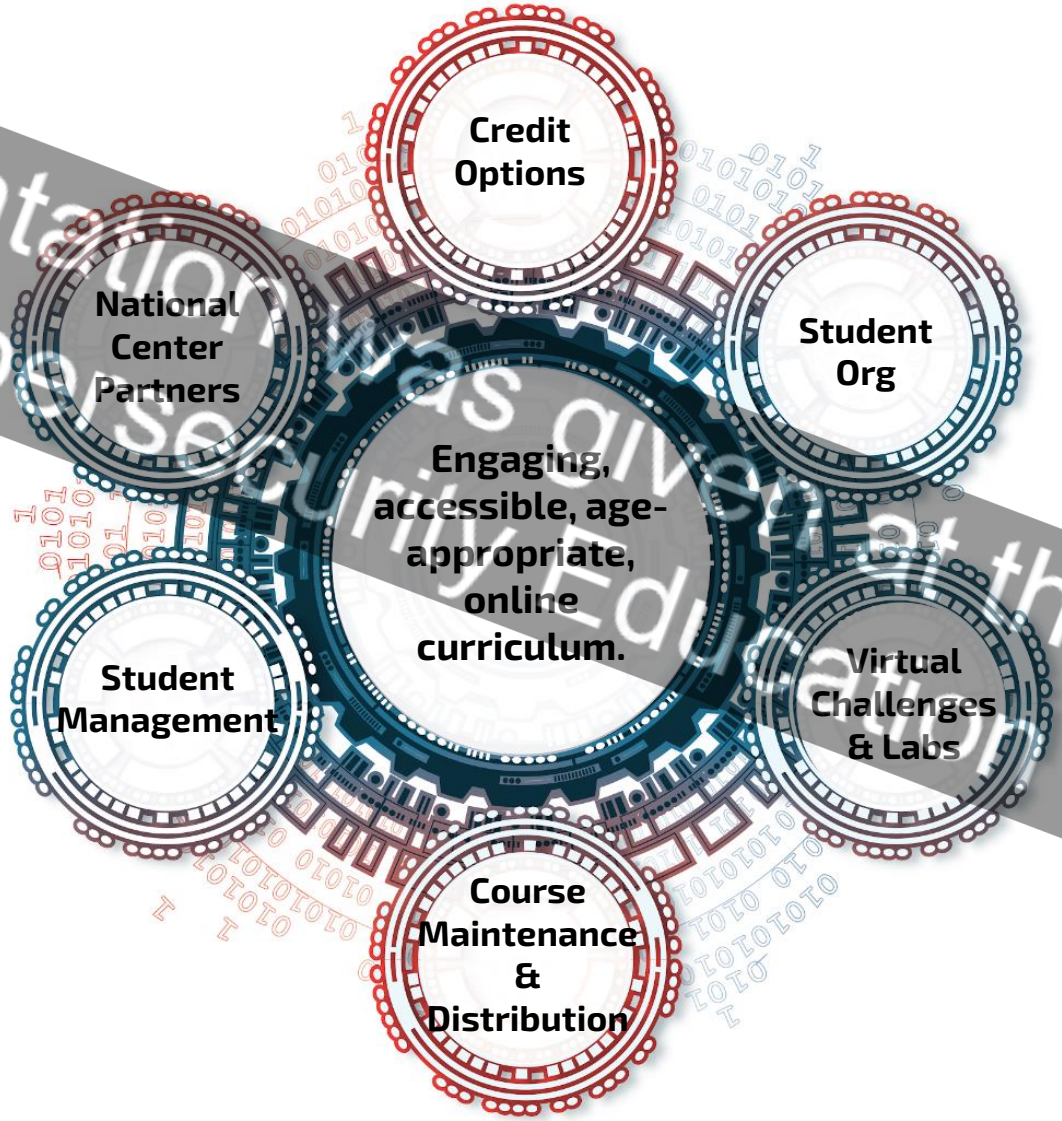
Jessica Pockrus
Instructional Support

Carolyn Sanderlin
Graphic Designer

RING Overview

RING

Regions
Investing in the
Next
Generation



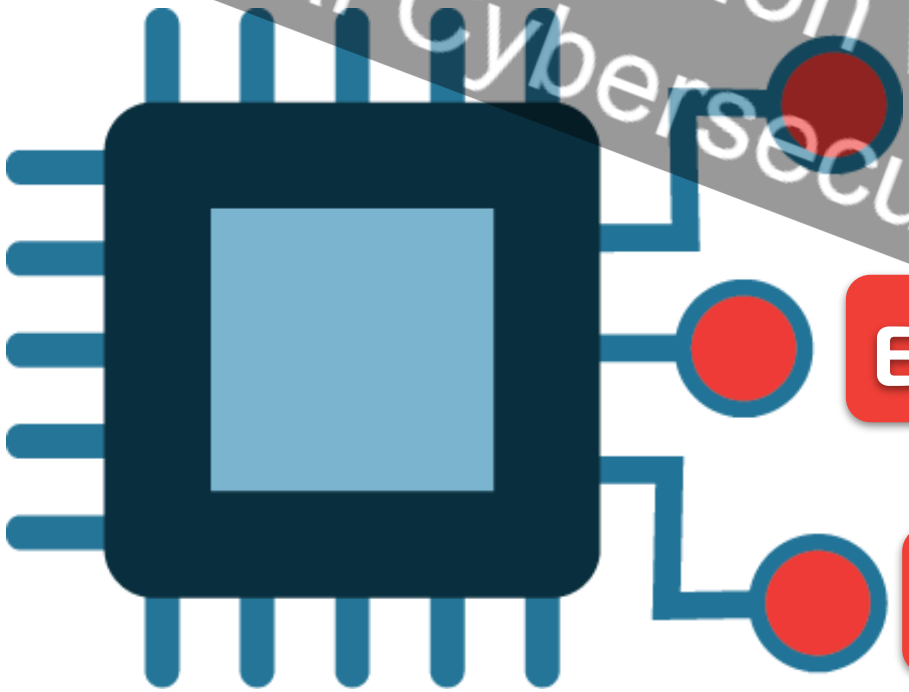
RING is…

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

Instructing RING

EPNC Centralized Instruction

1) tion- seasoned RING educators teach target demographic students in a proven virtual experience

EPI Regional Courses

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

External Instruction

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.
	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 LOs are sub-guidelines of 1.2 EU

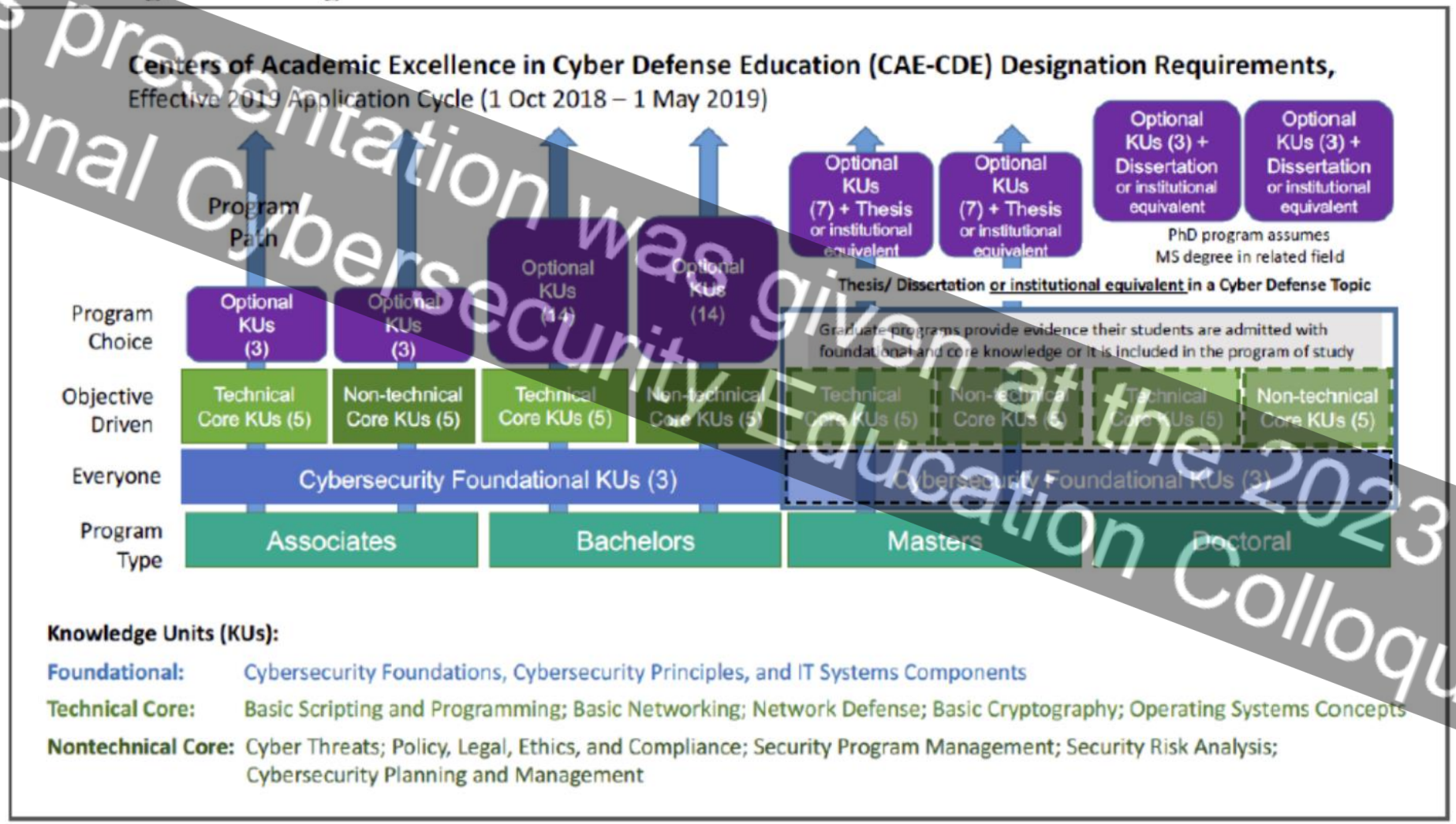
These EKs are sub-guidelines of 1.2.1 LO

These EKs are sub-guidelines of 1.2.2 LO

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

Learning guidelines from the CCG

Unit title and Big Idea

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

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	***Social goals reflect the foundational values held by society; these core societal values are reflected in cybersecurity choices.***	***F.CSF.t17***	***Ethics (Ethics associated with cybersecurity profession)***
1.1.1 LO	*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.*		
1.1.1a EK	*Societies are groups of individuals characterized by common interests/values that are perpetuated by persistent social interaction.*		

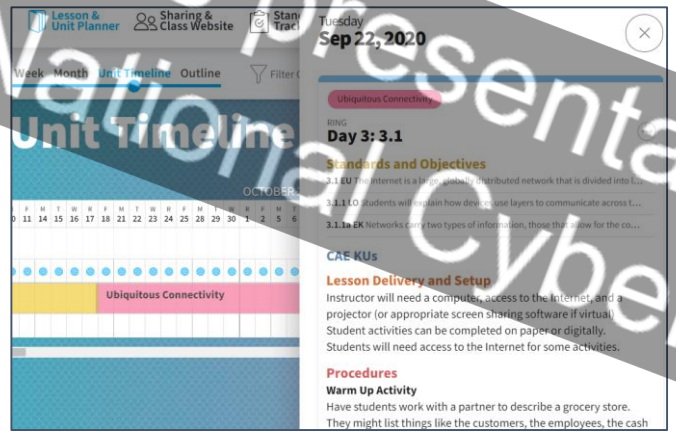
Guideline description

Knowledge Unit identifier

Topic description

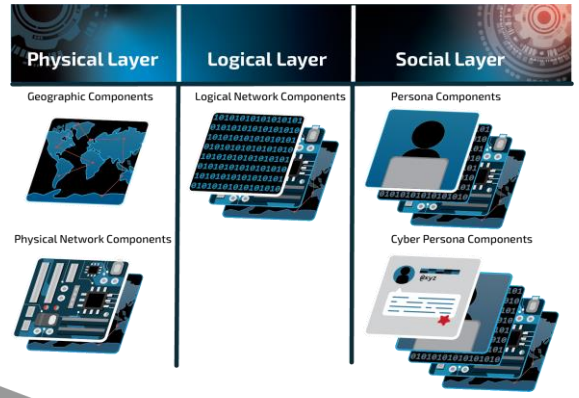
Curriculum Package

Lesson Plans & Instructor Slides

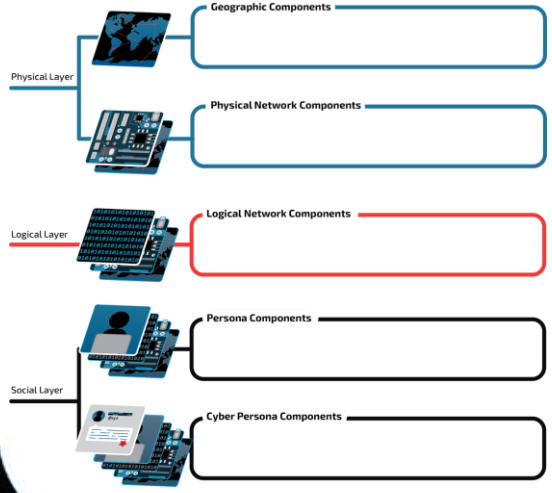


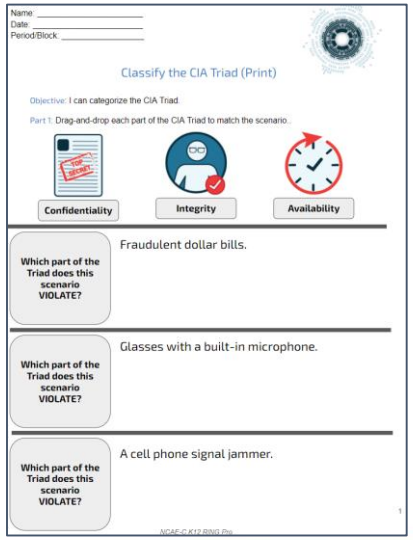
Labs & Games

Visually-Rich Content

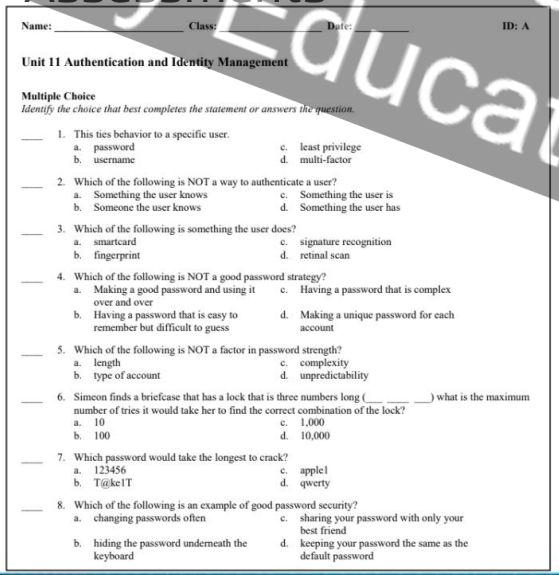


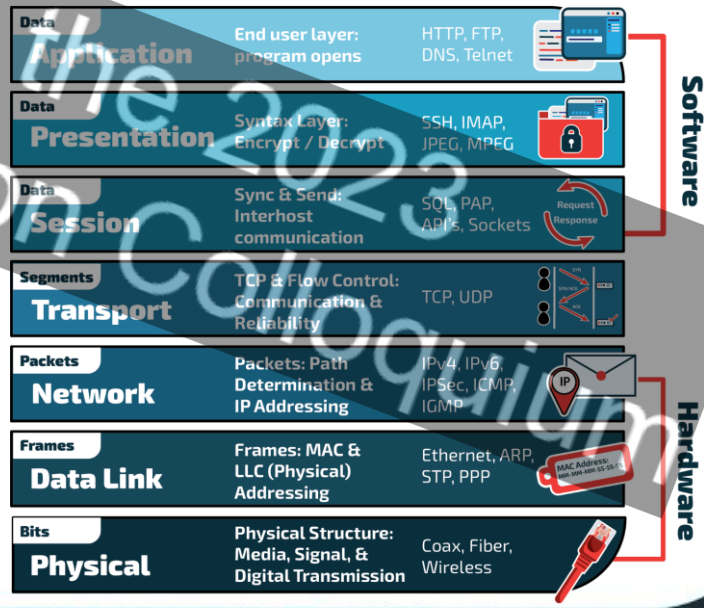
Graphic Organizers





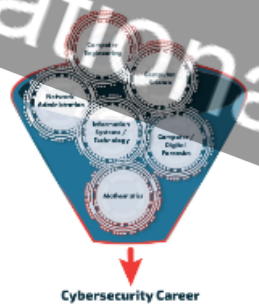
Assessments





RING Canvas

RING Modules



Unit 0: Introduction

Content List

Unit 1: Ethics

Content List

Unit 2: Establishing Trust

Content List

Unit 3: Ubiquitous Connectivity

Content List

Unit 4: Data Security

Content List

Unit 5: Introduction to Python Programming

Content List

Unit 6: System Security

Content List

Unit 7: Adversarial Thinking

Content List

Unit 8: Risk

Content List

Unit 9: Implications

Content List

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.

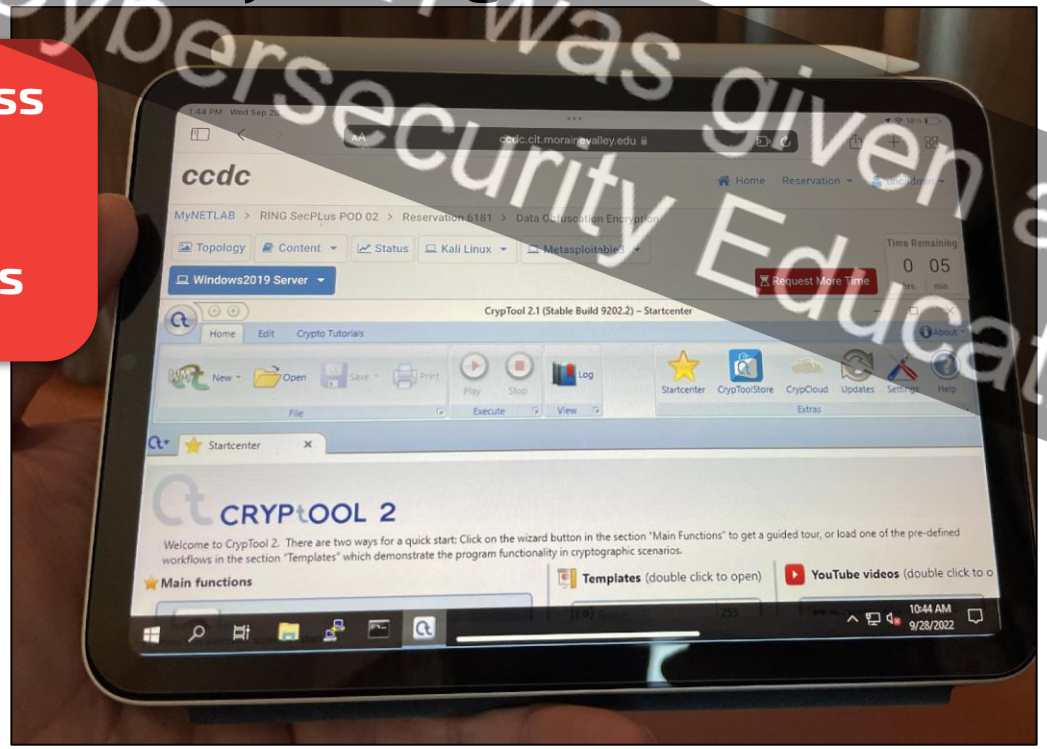
Lab Access

Netlabs offer virtual machines on any device.

Coastline Community College hosts Netlab

RING Netlab Access

- **19 teachers**
- **13 states**
- **364 students**

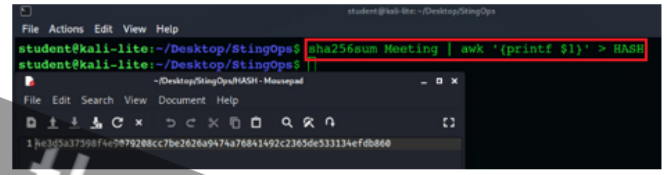


Competency Lab 3 – Hashing, Encryption, and Password Cracking

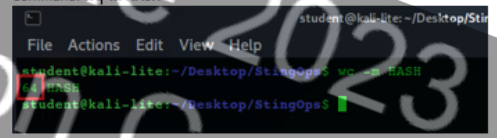
After your excellent work on the network, the agency is loaning you to help law enforcement to take down a ransomware group. As part of the sting operation, we have to send the file 'Meeting' from the StingOps folder located on Kali Linux desktop. We suspect that the group will try to change the contents 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 '{printf $1}' > HASH**



2. Count the number of characters in the HASH file. Is the number correct? Why?
   Command: **wc -m HASH**



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
- Kennesaw State University

Student Handbook

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

2023-2024 Academic Calendar

August 2023

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

September 2023

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

October 2023

S	M	T	W	T	F	S
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8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November 2023

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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December 2023

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24	25	26	27	28	29	30
31						

January 2024

S	M	T	W	T	F	S
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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February 2024

S	M	T	W	T	F	S
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11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29		

March 2024

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17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

April 2024

S	M	T	W	T	F	S
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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

May 2024

S	M	T	W	T	F	S
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5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

June 2024

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

July 2024

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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

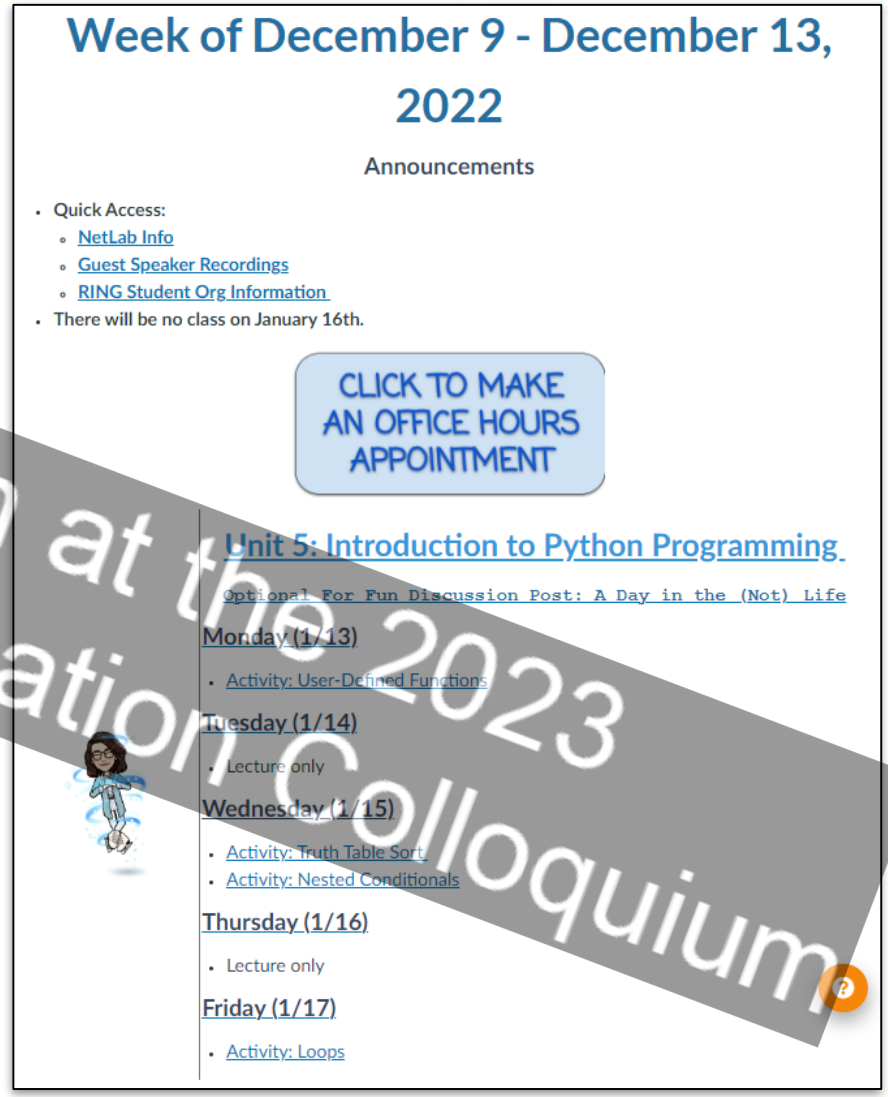
June 19 Juneteenth Holiday

July 4 Independence Day Holiday

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.*"



Curriculum Update - July

Released July 2023

- Assessments
  - Built-in standard mapping
  - 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 .imscc 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!

Educators* can gain full access to the curriculum package

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

Teacher Curriculum Request Form

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

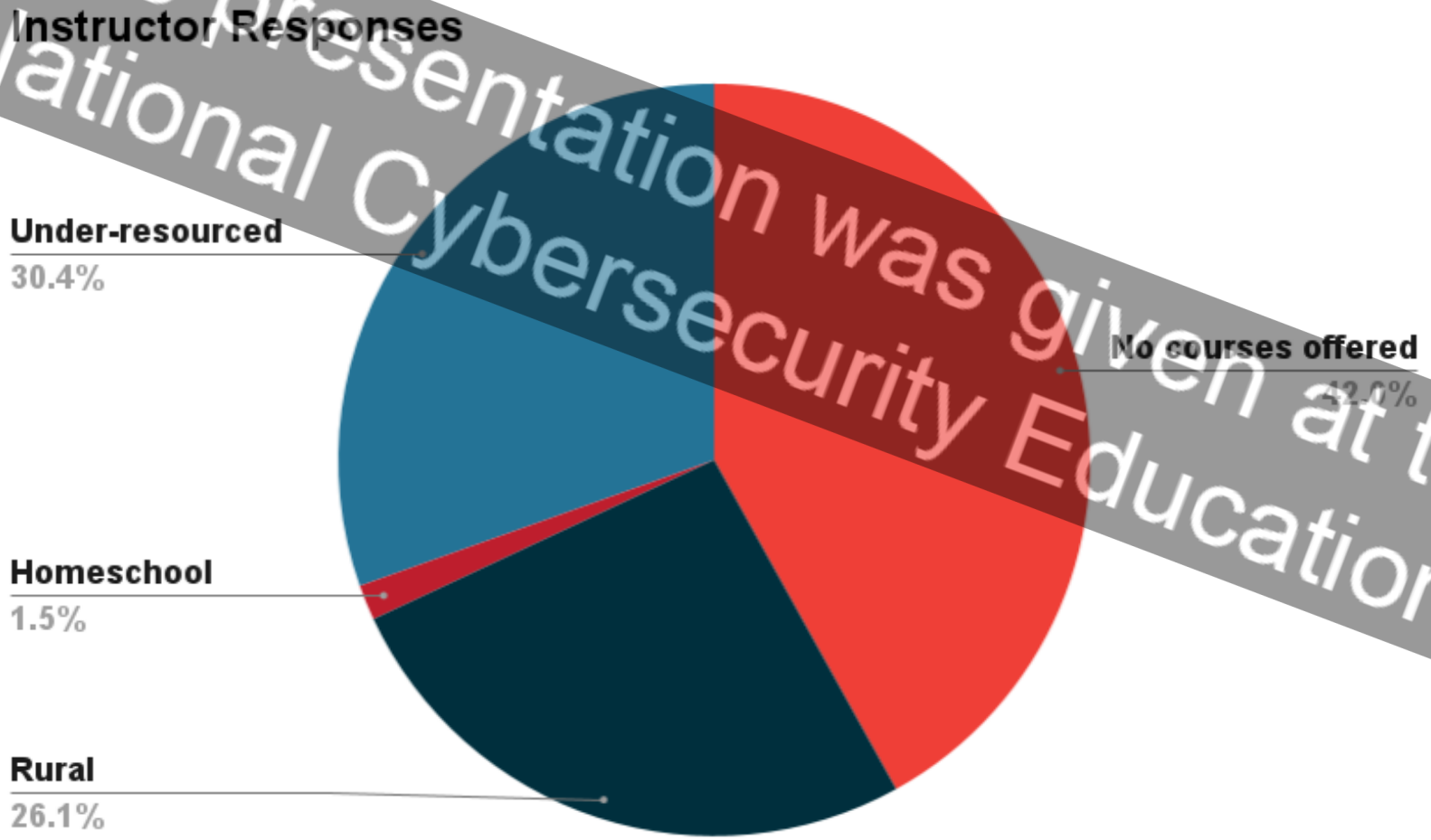
RING Teachers Nationwide

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

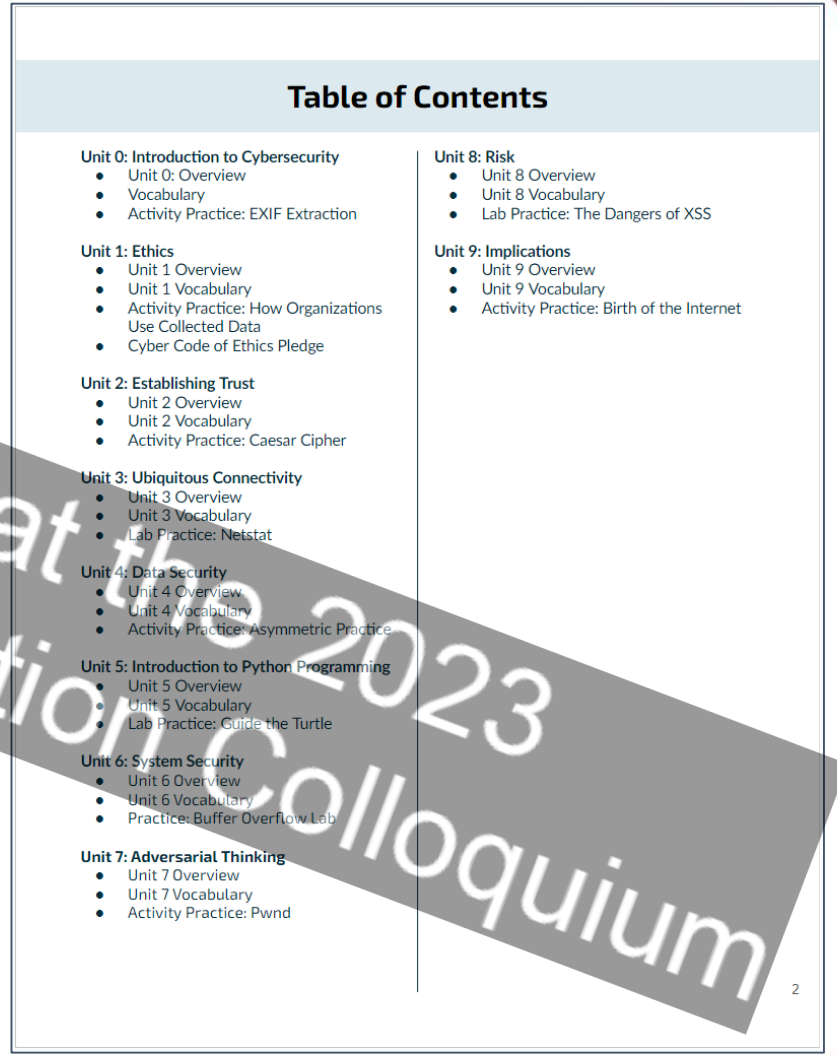
Demographics



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

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



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Industry-Backed Training

Teachers

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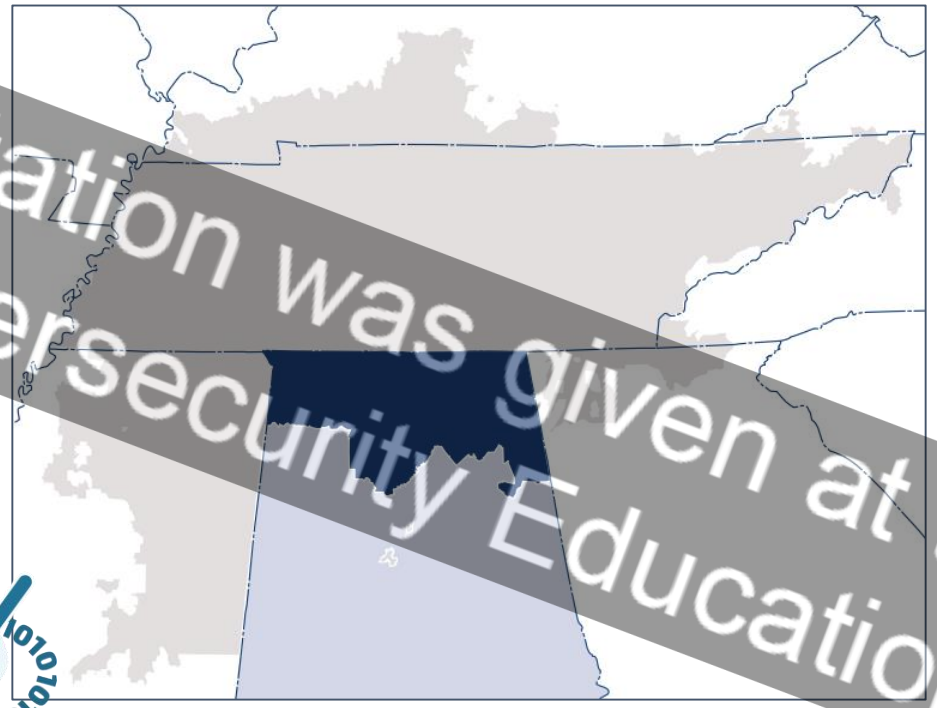
- TN: 4
- GA: 18
- KY: 3
- MS: 2
- NC: 9
- VA: 14



RING | 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

Student Enrollment Request Form

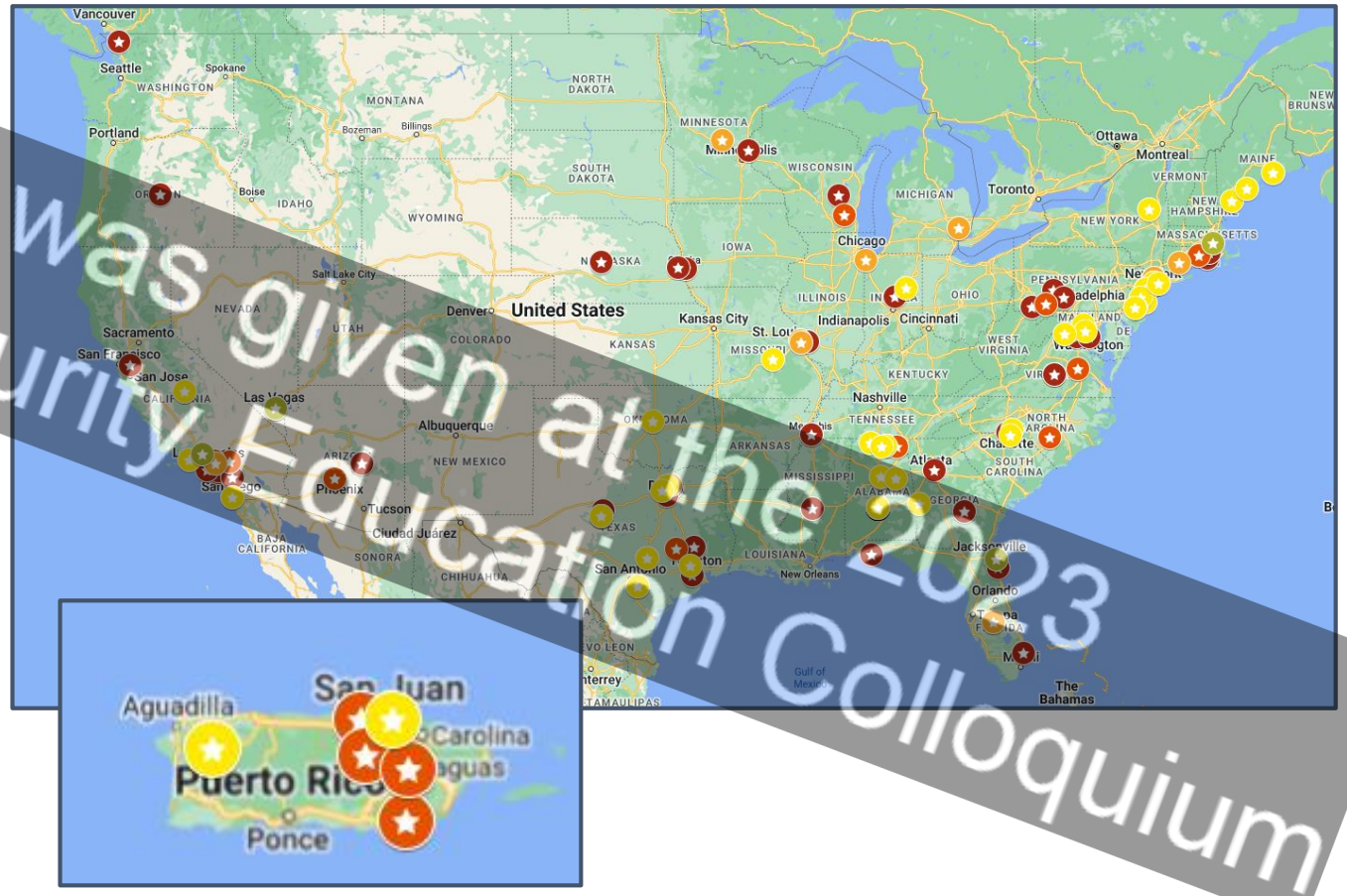
RING Centralized Course

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

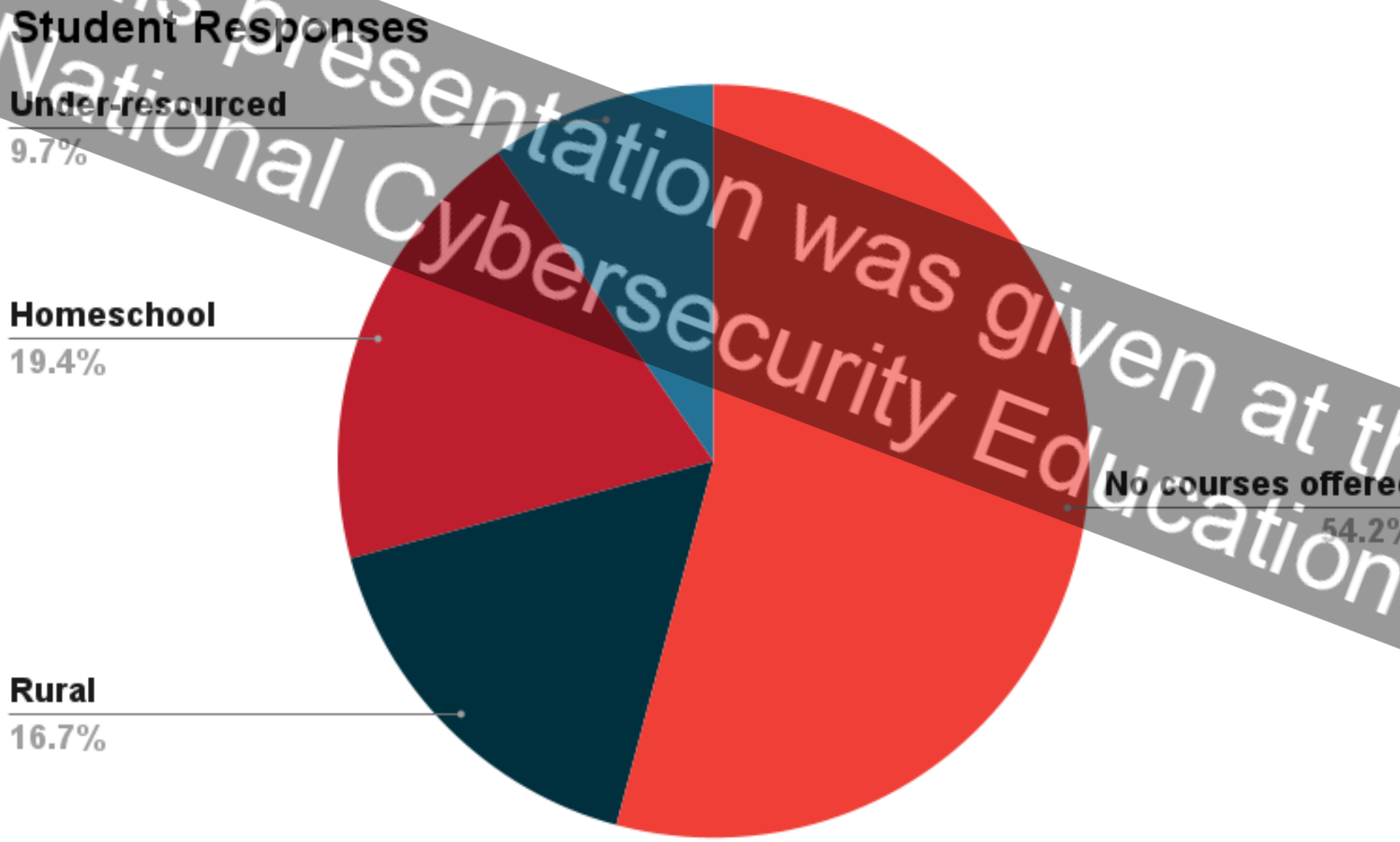
- Pilot course: 14 students completed
- 2022-2023: 31 students
- Spring 2023: 19 students
- Summer 2023: 18 students
- 2023-2024: 68 students are currently enrolled
- Fall 2023: 5 students are currently enrolled

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



Note that students and parents are self-reporting.

RING Participants by

Southwest Regional Hub
- 141 Instructors
- 42 Central Students

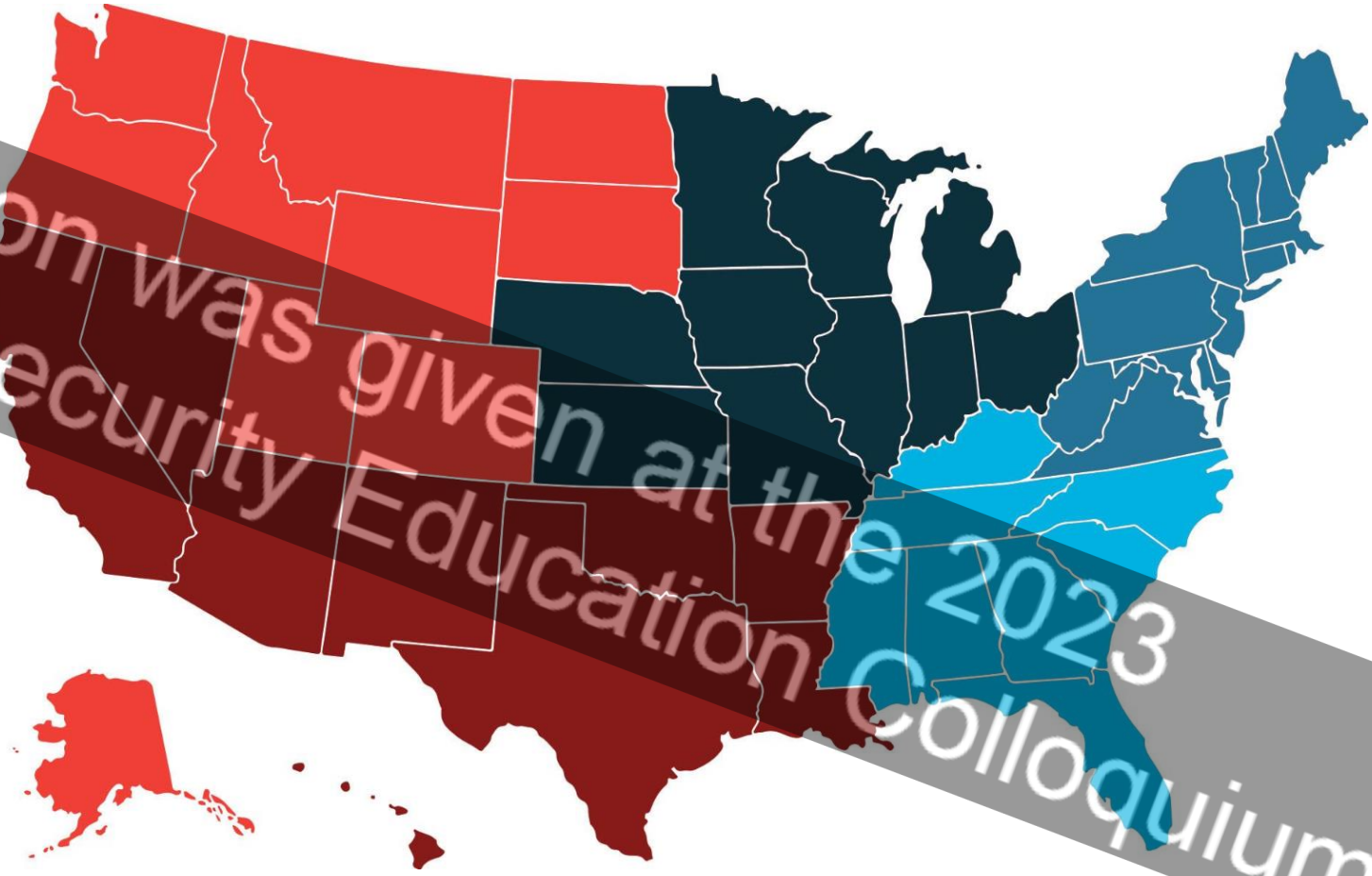
Northwest Regional Hub
- 63 Instructors
- 2 Central Students

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 c

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 p[illegible] and c[illegible]

Pathways: College

TEANECK, NJ

FAIRLEIGH DICKINSON UNIVERSITY

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**

NATIONAL CENTERS OF ACADEMIC EXCELLENCE IN CYBERSECURITY

MAUI, HI

UNIVERSITY of HAWAI'I® MAUI COLLEGE

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 debasisb@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 feasable 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 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.

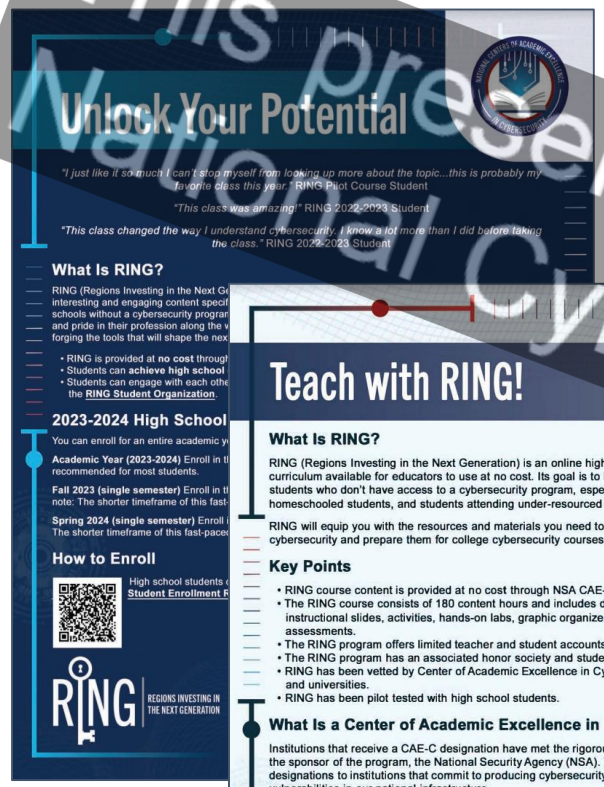
RING's Color Palette

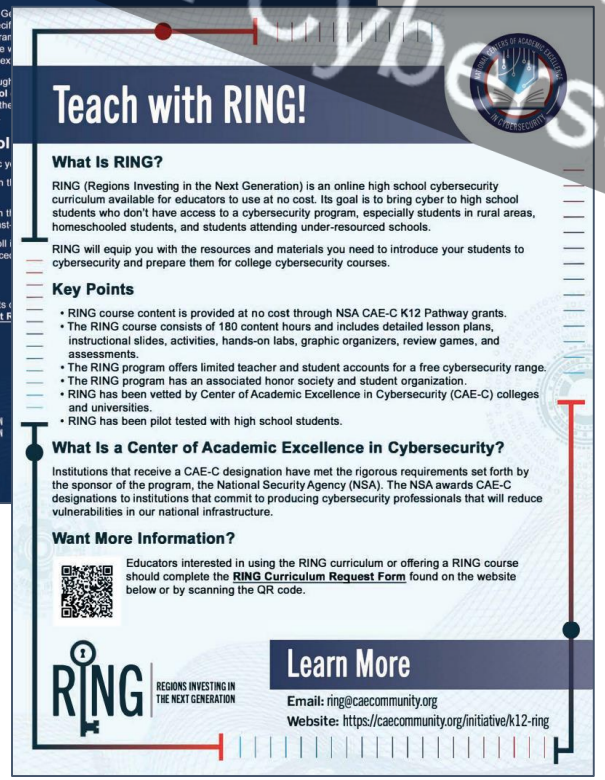
RING Colors

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

RING Promotional





Contact Info

REGIONS INVESTING IN THE NEXT GENERATION

This presentation was given at the 2023 National Cybersecurity Education Colloquium

ring@caecommunity.org

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	▪ 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	▪ 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	▪ 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	▪ 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	▪ 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	▪ 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

Recognizing POS Pathways

K12 Criteria

CTE POS 10 Essential Components

CAE Institutions

K12 or HS Programs

CAE Criteria Committee

Key Elements (6) of Career Pathways

Collaborations

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

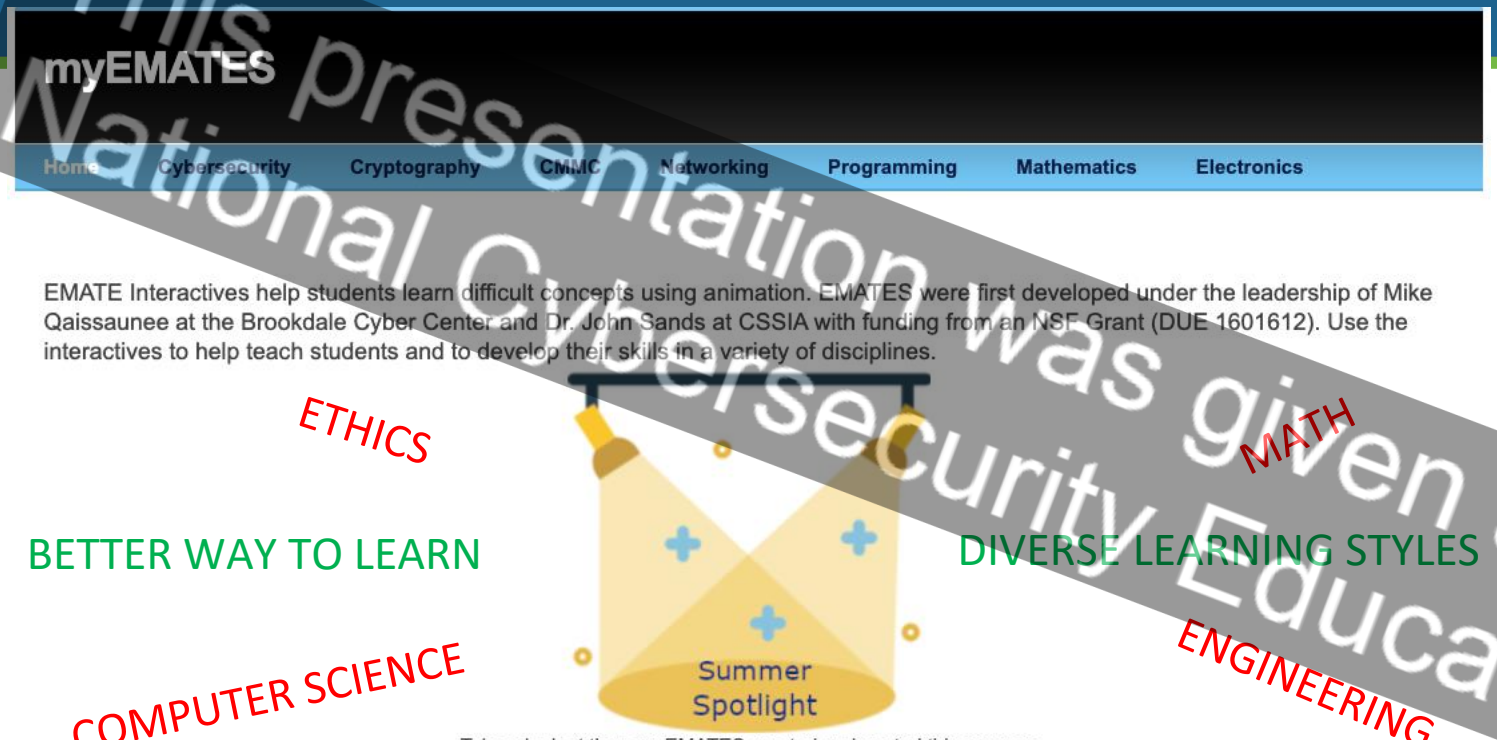
Other Collaborations

- 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 Incubato
- 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

EMATE Library



ETHICS

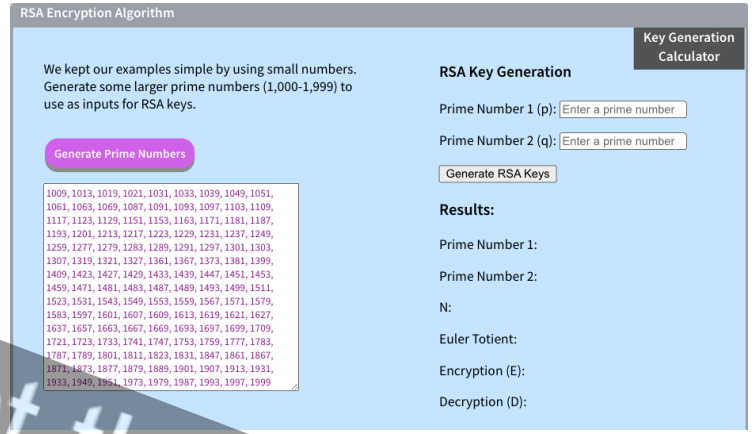
BETTER WAY TO LEARN

COMPUTER SCIENCE

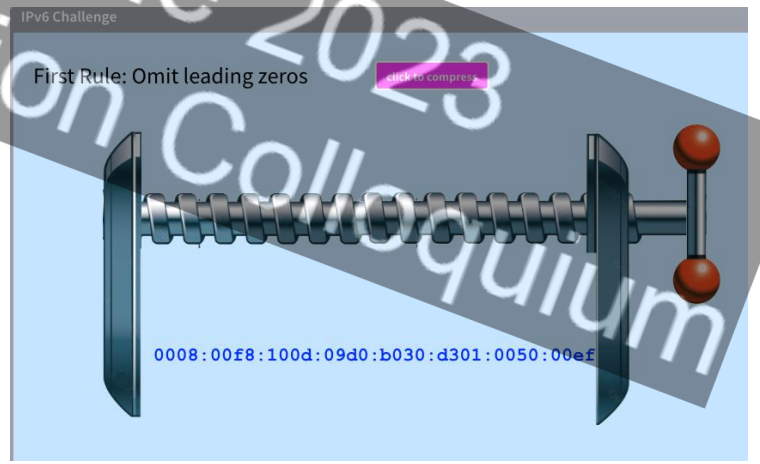
MATH

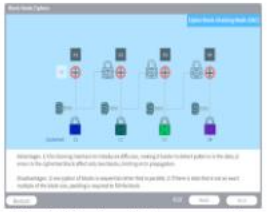
DIVERSE LEARNING STYLES

ENGINEERING



CYBERSECURITY PRINCIPLES




Block Mode ciphers used in symmetric encryption algorithms


Digital Signatures

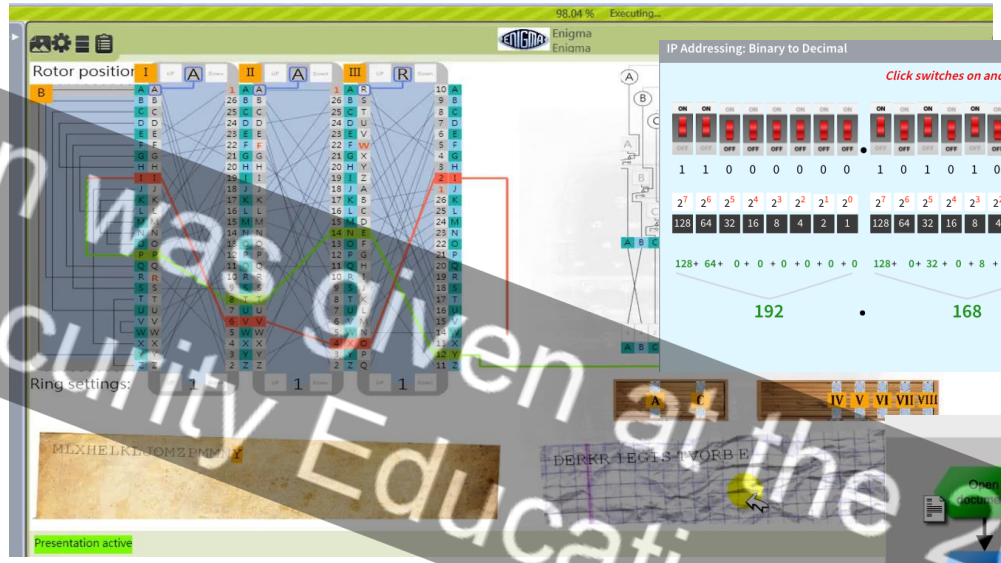

Encryption and Data Formatting

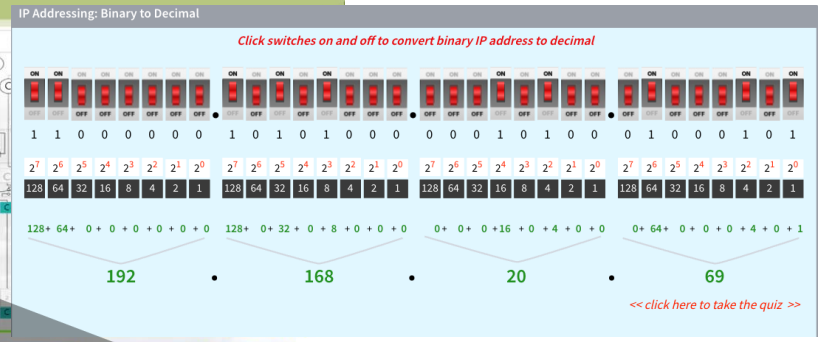

RSA Encryption Algorithm

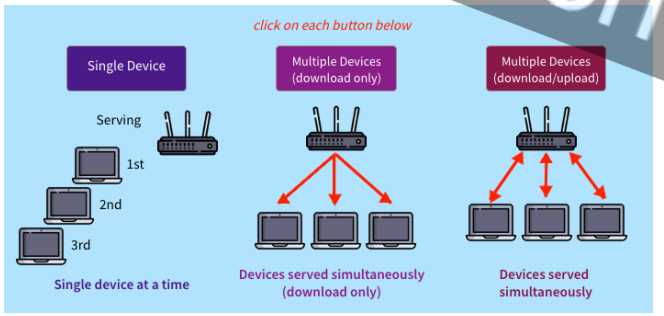

Factoring and Prime Numbers are the building blocks for asymmetrical encryption algorithms

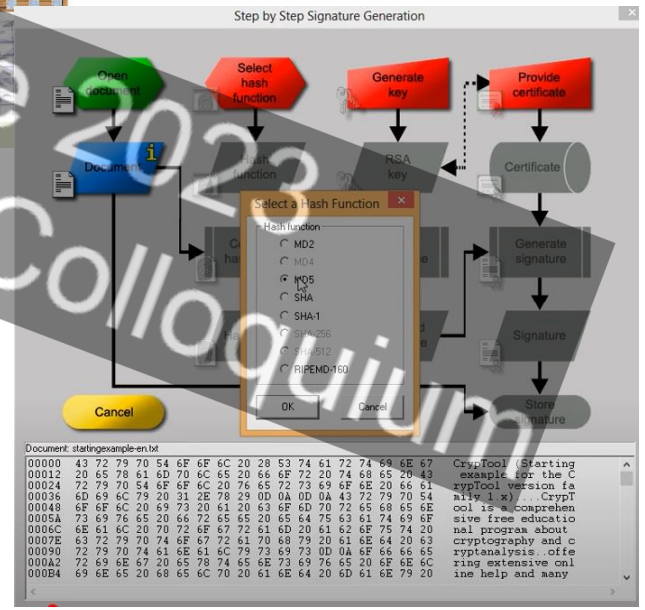
Cryptography Exercises/Activities

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

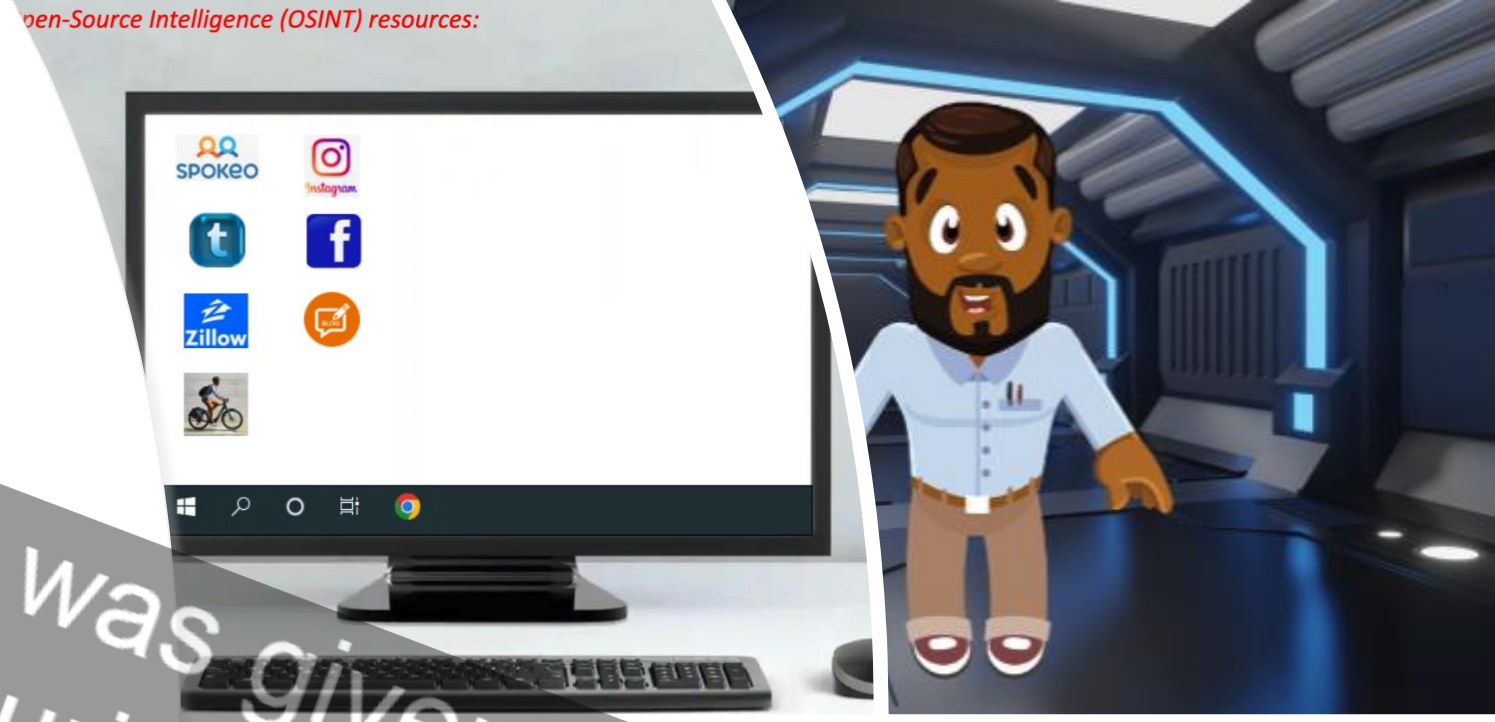


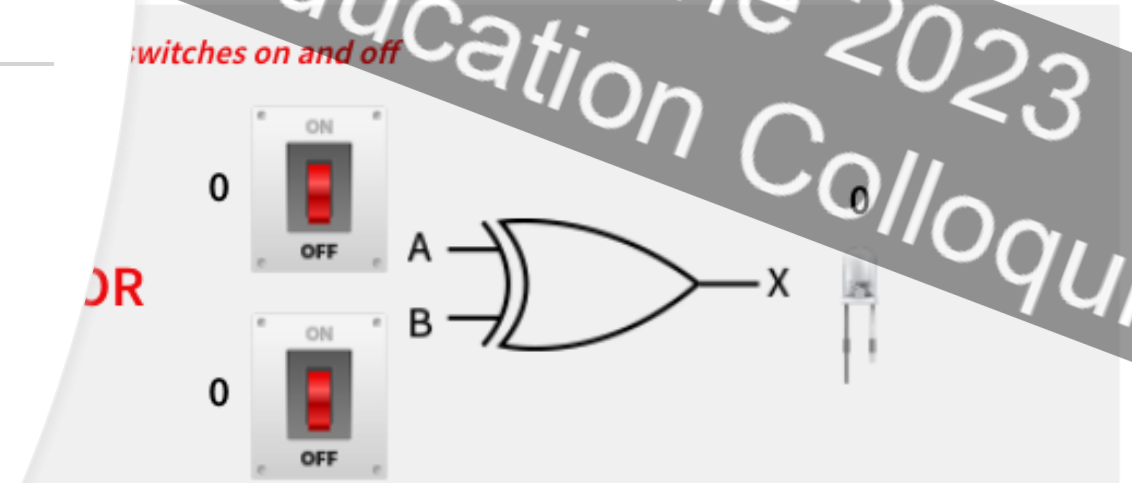






Cybersecurity Games

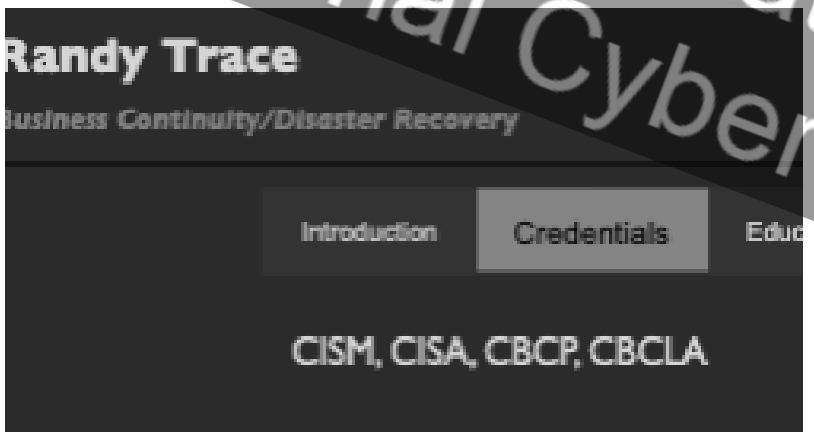


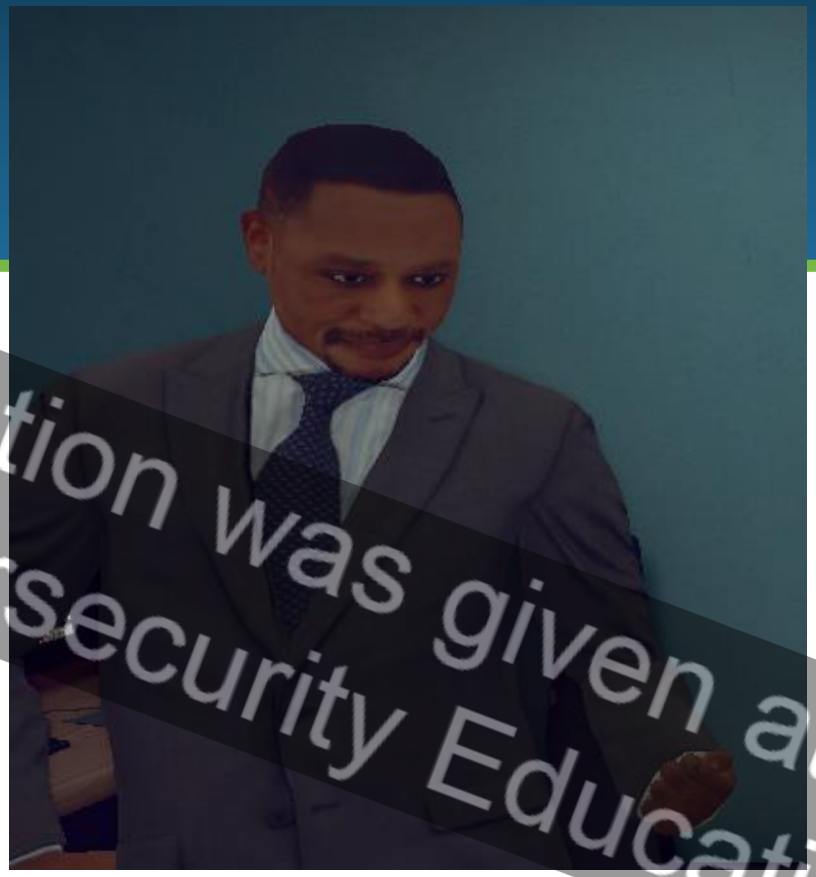


Boolean Expres

$X = A \oplus B$

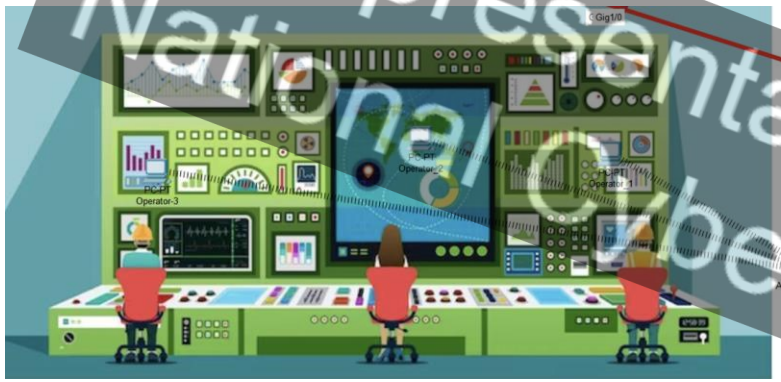
INPUTS	
A	B
0	0
1	0
0	1
1	1

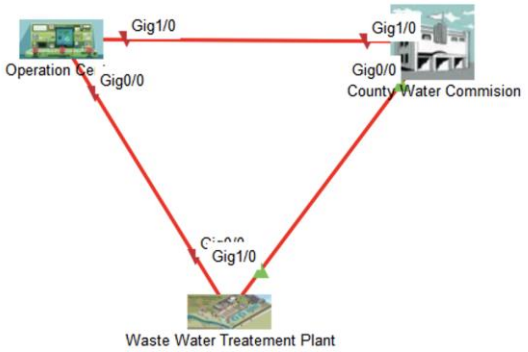


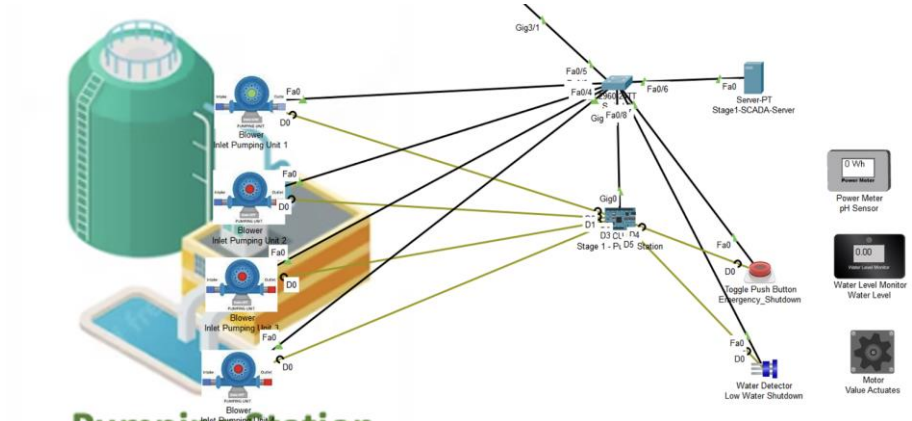


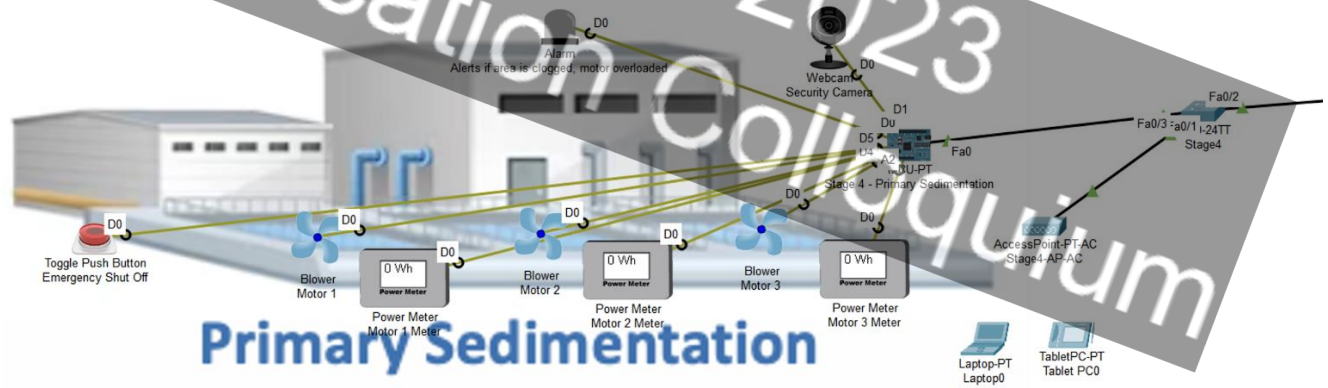
3D/2D VR/ER/AR

Embedded AI





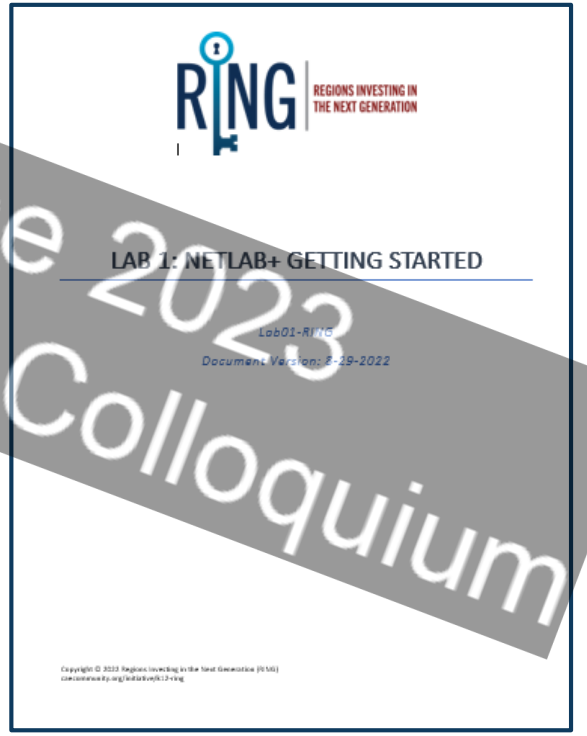




RING Enhancement Labs

- 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

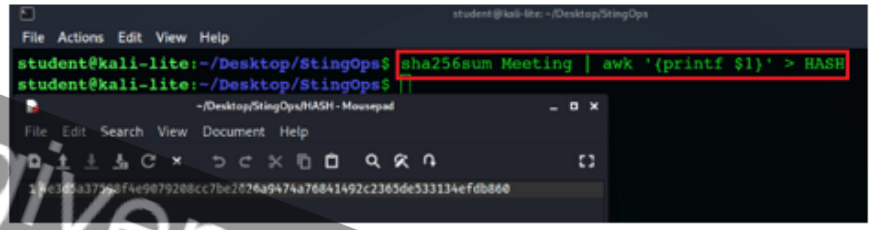
- Instructor guide provides step-by-step instructions and additional resources to solve each challenge.

Competency Lab 3 – Hashing, Encryption, and Password Cracking

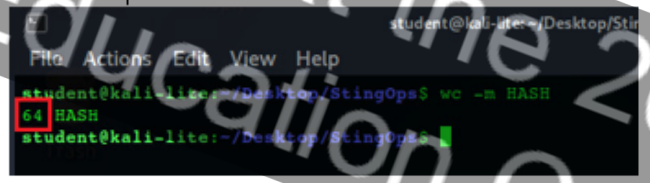
After your excellent work on the network, the agency is loaning you to help law enforcement to take down a ransomware group. As part of the sting operation, we have to send the file 'Meeting' from the StingOps folder located on Kali Linux desktop. We suspect that the group will try to change the contents 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**



2. Count the number of characters in the HASH file. Is the number correct? Why?
   Command: **wc -m HASH**



   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.

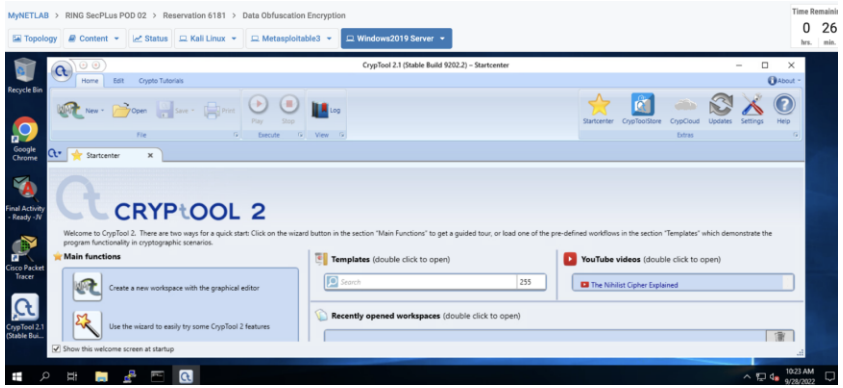
3. Please identify the correct document.

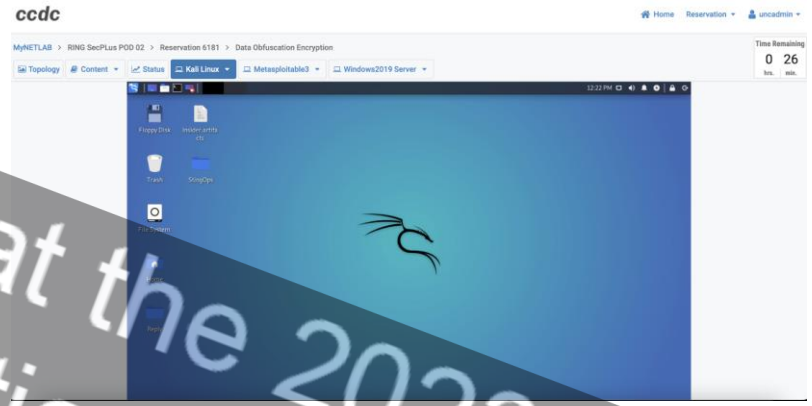
   Command: **sha256sum <file(s)> >> Candidates OR find -type f -exec sha256sum {}\; > Candidates**
   grep -f <sent_hash_file> Candidates

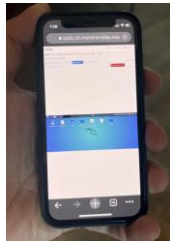
Established Range Access Infrastructure




- 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

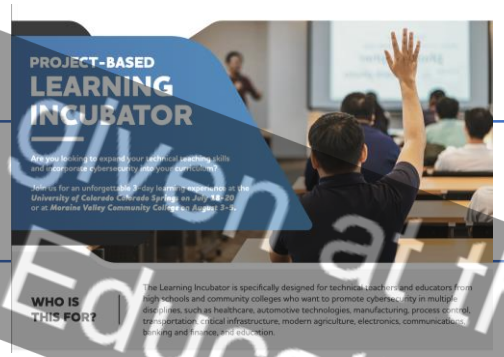
Cybersecurity Incubator

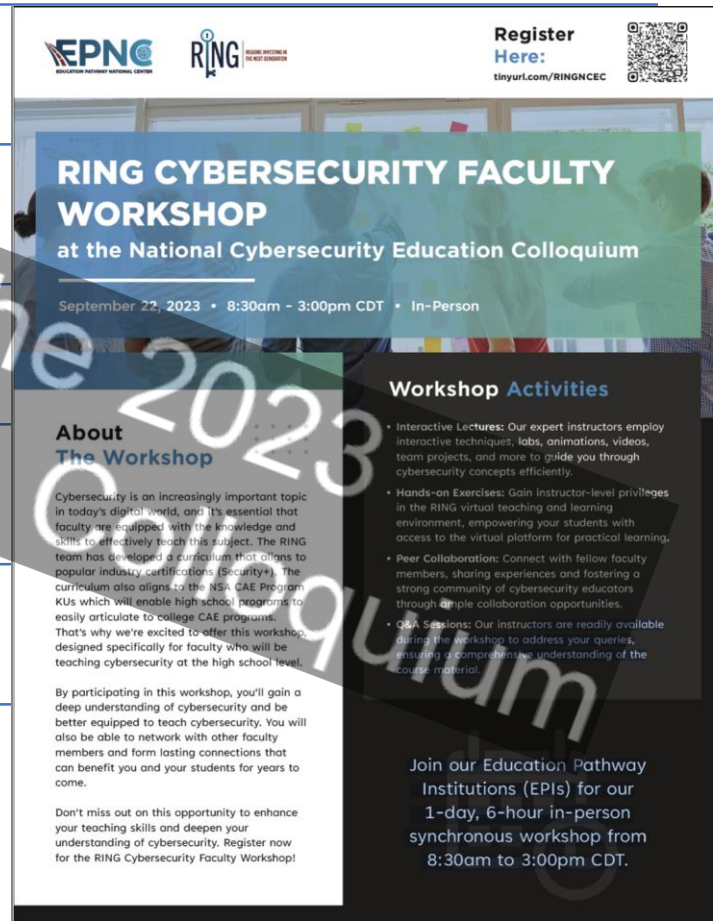
Model Dual Credit / Dual Enrollment

Attracting New Cybersecurity Faculty

Access to Virtual Environment

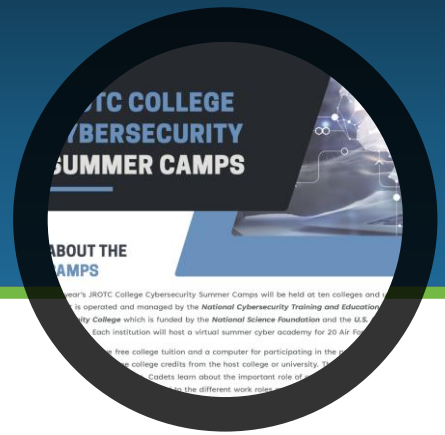
Alignment to Perkins V Requirements

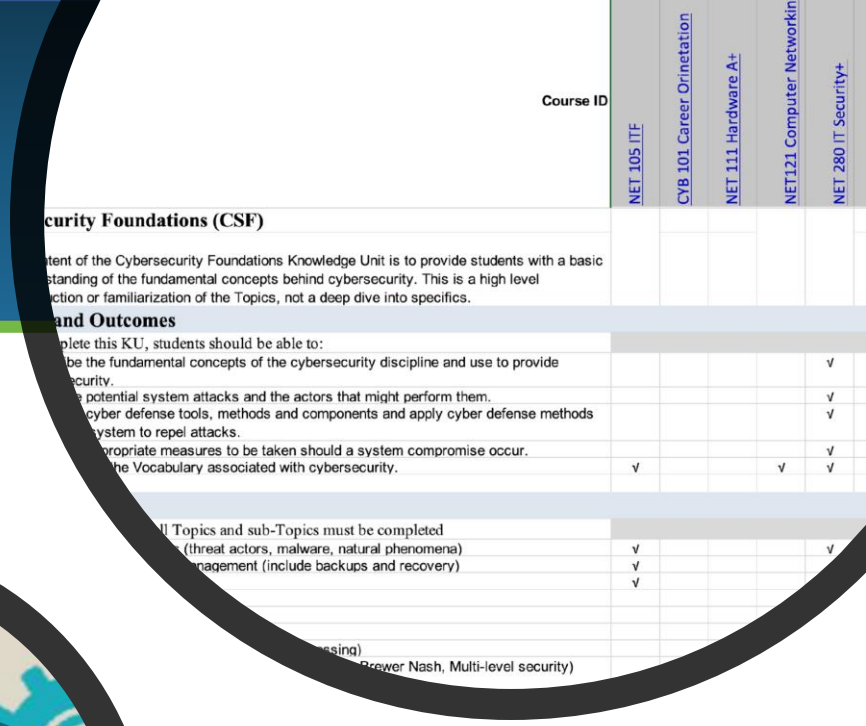


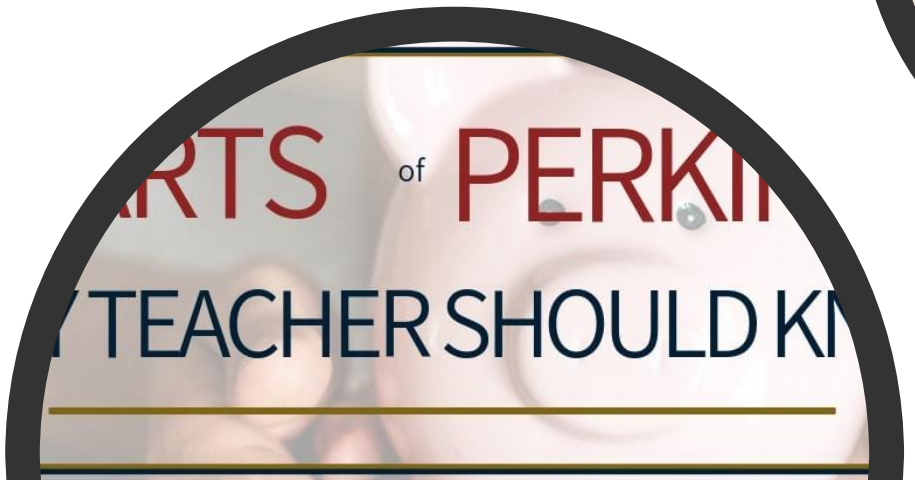


Dual Credit / Dual Enrollment Models

- 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

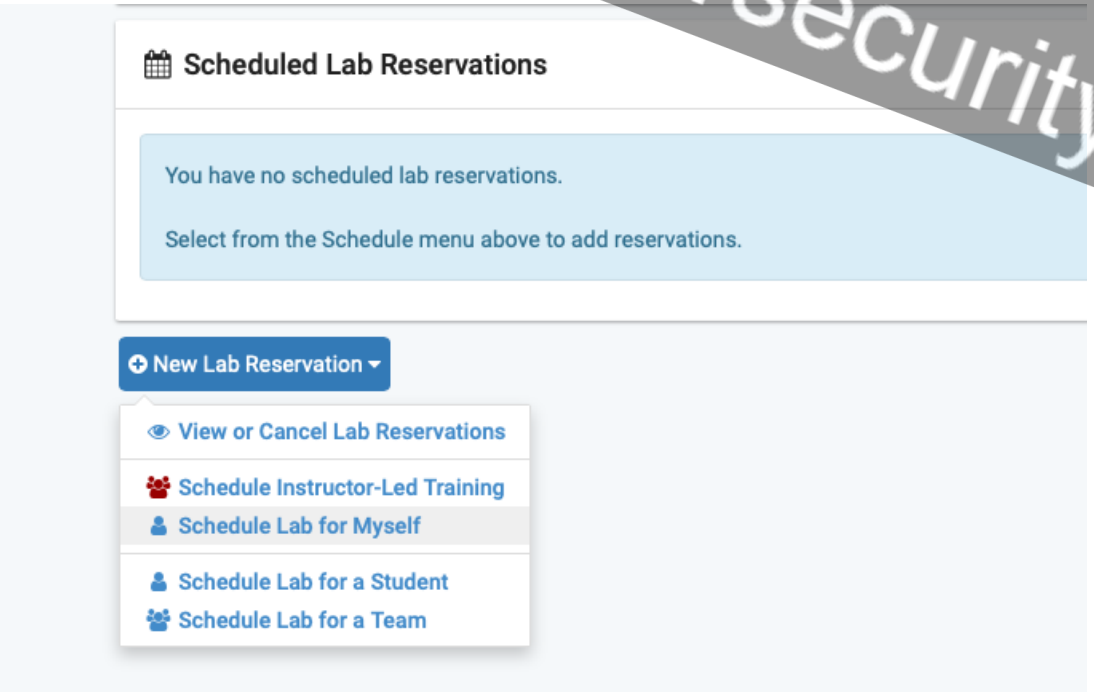






Range Access and Support

- 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.

RING
REGIONS INVESTING IN THE NEXT GENERATION

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

EPNC
EDUCATION PATHWAY NATIONAL CENTER

NCAE-C Education Pathway National Center

Questions / Comments ?