



Eleanor Taylor

Workforce Development
Program Office

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Accelerating Industrial Cybersecurity Workforce Development – Doing Better Together

National & Homeland Security

INL's Vision –

To change the world's energy future and secure our nation's critical infrastructure.

Energy security is national security.

America's prosperity, freedom and ability to advance is inextricably linked to our resources and infrastructure.

At INL, dedicated professionals defend these systems from cyber and physical threats, unauthorized intrusions and disruptions.

Protecting the nation's energy systems from physical or cyberthreats is one of our most important missions.

INL National & Homeland Security Directorate Workforce Development Program Office

Address the most critical control systems and cybersecurity challenges that require a national collaborative, inter-disciplinary environment



Drive a culture change
in engineering

Increase cybersecurity of systems
deployed and under development



Enhanced
partnerships

Advance control systems
cybersecurity gaps



Accelerate workforce
development

Support demand for control
system cybersecurity talent

National Workforce Capability Gaps



Over 3 million

unfilled cybersecurity jobs globally in 2023 [Cybersecurity Ventures](#)



Innovative R&D and proactive validation for long-term solutions



Cyber-informed and advanced technology education

Hands-on training and applicable skills from education



Over 90%

national control systems cybersecurity workforce needs are NOT being met.

-CyberSeek



Over 8 trillion

In damages expected from cybercrime in 2023

-[Cybersecurity Ventures](#)

Actionable threat analysis, situational awareness, and information sharing

High quality and immediate incident response and forensics



National Cybersecurity Education at the 2023 Colloquium

Information Technology (IT) and Operational Technology (OT)



Information Technology



Operational Technology

Being controlled	Data	Physics
Measurement	Bits and bytes	Temperature, pressure, flow
Lifecycle	System lifecycle	Facility lifecycle
Consequences	Competitive disadvantage Embarrassment Financial loss	Product damage Loss of life Environmental release
Desired system characteristics	Confidentiality Integrity Availability	Safety Reliability Functionality
Educational background	Computer Science Information Systems Cybersecurity	On the job Career & Technical Education Electrical Engineering
Reporting chain	ISO CISO CIO	Shift Supervisor Plant Manager COO
Managerial accounting	Cost center	Profit center

This presentation was given at the 2023 National Cybersecurity Education Colloquium

Investing in the Future

INL actively gives back to the community and state by supporting several ICS workforce development programs

N&HS Cybersecurity Expertise & Research Areas

- Cybercore Integration Center
- Critical Infrastructure, Security and Resilience

Related Programs and Opportunities:

- Adjunct Faculty and Invited Speakers
- Faculty Researchers
- Internships
- Practicums
- STEM Education and Outreach



Girls Go Cyberstart National Competition

Cybercore Summer Camp

Current offerings

- Intro and Advanced Camps
- More offerings across the state
- Teaming across institutions

Future focus.....

- Teachers
- Adult learners
- Additional locations and partners

CYBERCORE SUMMER CAMP

Now enrolling in **IDAHO FALLS**

INTRO CAMP July 18-22, 2022
ADVANCED CAMP August 1-5, 2022
\$125/week

The Cybercore Summer Camps introduce high school students to the world of cybersecurity and information technology. Participants will be introduced to:

INTRO CAMP

- Computing basics, using Windows & Linux
- Programming with python
- Circuit design
- Binary, hex, encoding, and cryptography & more
- Raspberry Pi for each student

ADVANCED CAMP

- Automation with python
- Circuit design, soldering & embedded system construction
- Safe & secure online behavior, including email and web security skills
- Cybersecurity "red versus blue" attack and defend games
- Raspberry Pi accessory kit for each student

Limited Space Register Early
frankie.adams@cci.edu | 208-355-3343 | cci.edu/intcc/

CYBER SUMMER CAMP

Now enrolling in **BOISE**

July 18-22, 2022
9 a.m. to 3 p.m.
\$150
Lunch provided

The Cyber Operations and Resilience Program (CORP) is hosting the Cyber Summer Camp for junior high and high school students (7th-12th grade) to provide students with a hands-on experience in the world of information technology and cybersecurity. Students will learn the basics of information technology and security, as well as cybersecurity basics.

- Learn what's in a computer
- Install an operating system
- Build a network
- Learn what a cyber blue team does

Register by June 3rd!
boiseslate.edu/corps/outreach/cyber-summer-camp/

CYBERCORE SUMMER CAMP

Now enrolling in **NORTH IDAHO**

July 18-22, 2022
9 a.m. to 3 p.m.
\$150

Includes a Raspberry Pi Kit and Lunch!

The Cybercore Summer Camp is a summer program for high school students and local residents that introduces high school students to the world of cybersecurity and information technology. Participants learn how to network, and cybersecurity will participate in hands-on learning activities, gain access to industry mentors through demonstration by lecturers, and experience real world corporate through simulation tasks coordinated by local industry partners.

LC StateSecurity Operations Center
Thomas Jefferson Hall Room 117
www.lcc.edu/business/cybercore-summer-camp

CYBERCORE SUMMER CAMP

Now enrolling in **TWIN FALLS**

July 18-22, 2022
9 a.m. to 3 p.m.
\$125

T-shirt & Raspberry Pi provided!

The Cybercore Summer Camp is an IN-PERSON EVENT held on the college of Southern Idaho campus that introduces high school students to the world of cybersecurity and information technology. Participants learn how to:

- Computer basics, using Windows & Linux
- Safe & secure online behavior
- Programming with python
- Cybersecurity
- Circuit design
- Binary, hex, encoding, and cryptography
- "Capture the Flag" event

Registration
www.lcc.edu/business/cybercore-summer-camp_boise

ICS Cyber Escape Rooms

Defense, Wireless, Network Discovery, Can You Hack It? Solar, Wind and Fire

- Benefits
 - Promotes critical thinking
 - Awareness of applying multiple skills within a single scenario
 - Tests policies and procedures applicability and identifies gaps
 - Identifies the importance of communications – the difference between winning and losing
- Flexibility
 - Scenarios can have several levels of complexity based on audience
 - Team or individual



Cyber-Informed Engineering (CIE)

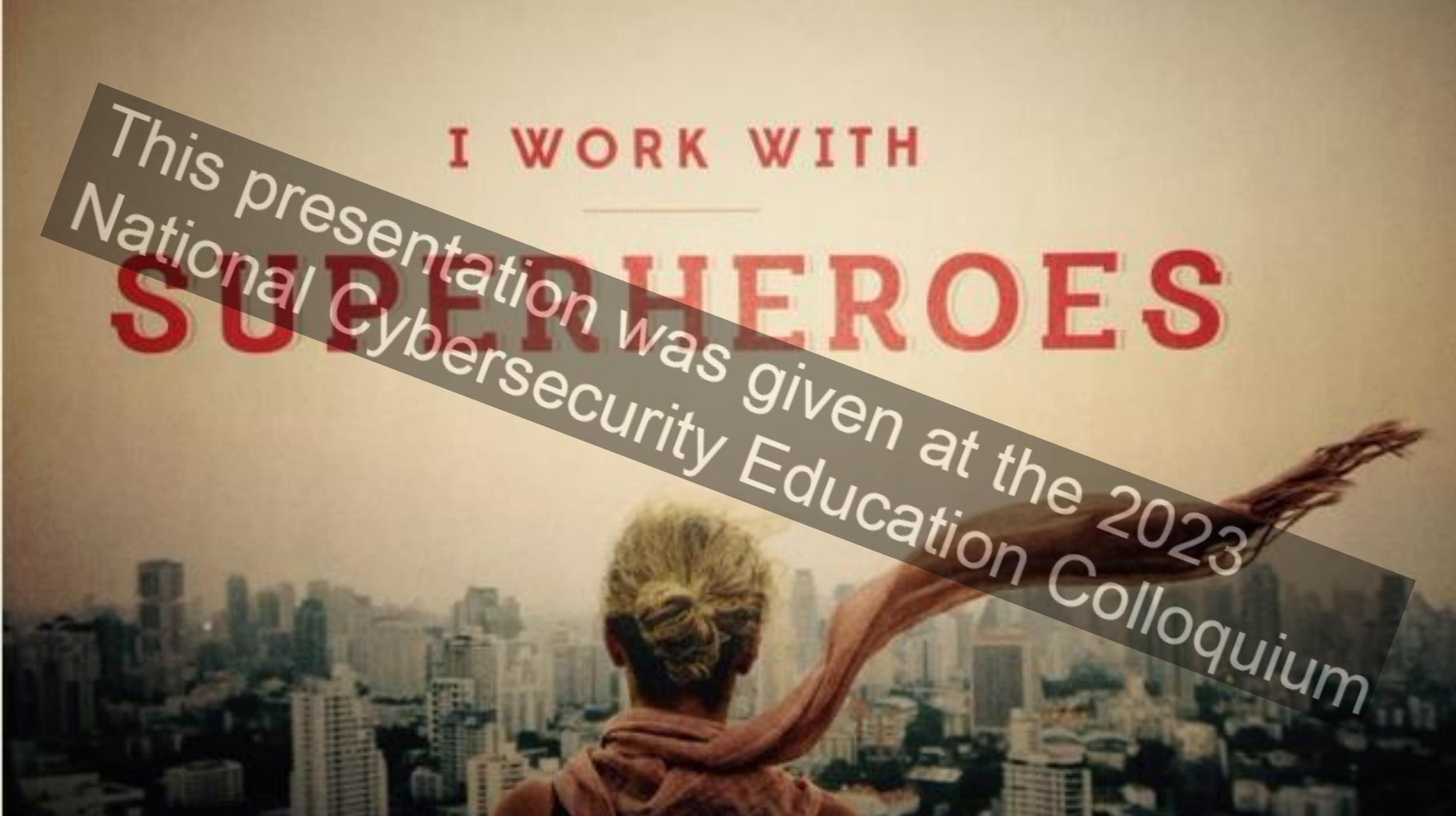
- CIE uses design decisions and engineering controls to eliminate or mitigate avenues for cyber-enabled attack.
- CIE offers the opportunity to “engineer out” cyber risk throughout the design and operation lifecycle, rather than add cybersecurity controls after the fact.
- Focused on engineers and technicians, CIE provides a framework for cyber education, awareness, and accountability.
- CIE aims to engender a culture of security aligned with the existing industry safety culture.
- CIE Implementation Guide just released:
<https://www.osti.gov/biblio/1995796>



I WORK WITH

SUPERHEROES

This presentation was given at the 2023 National Cybersecurity Education Colloquium



Employee Engagement

Increase employee engagement (DEI&A) in INL K-12 education program by empowering INL employees to engage in community and region, while becoming STEM mentors, role models and ambassadors. “If you can see it, you can be it!”

- Leverage STEM ambassadors and Special Forces for community and regional outreach and engagement.

- Build capacity for high school mentoring and curriculum development.

- Leverage leadership and SMEs for meaningful interactions and feedback for students



Strategic Plan

Vision: Inspire tomorrow's workforce by building a strong STEM foundation today.

Mission: Instill a strong STEM identity for all students to build a diverse future STEM workforce; positively impact students, educators and families in our community and region; and empower employees to become STEM role models and mentors.



STEM for All
(DEI&A)



Prepared
Workforce



Employee
Engagement

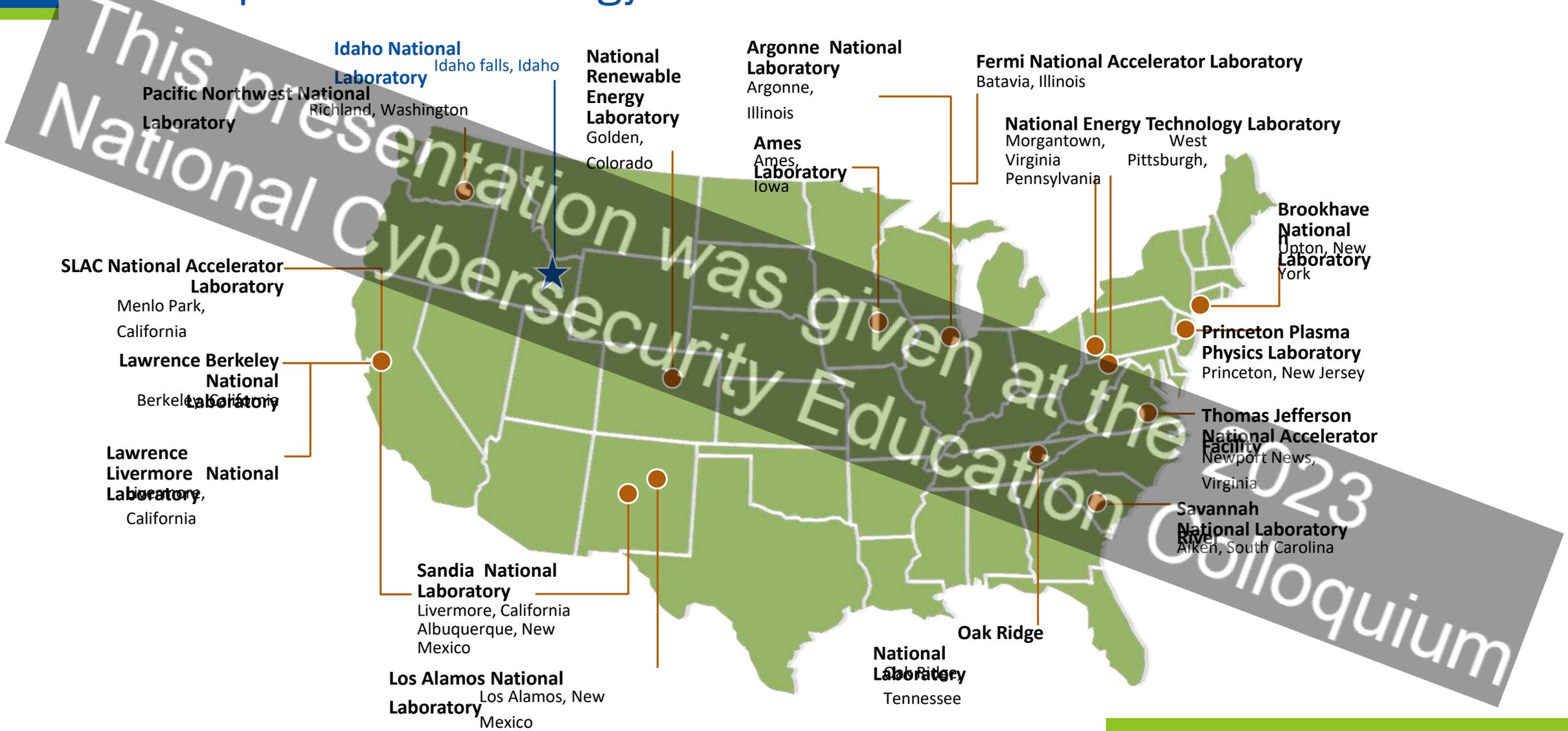


STEM Ambassadors

- Everybody who contributes to our mission has something unique and important to share with students of all ages. **STEM Ambassadors** are vital to expanding INL's reach to students throughout the region.
- INL employees who bring their vast science, technology, engineering and math experience to schools and events across the state.
- These volunteer STEM experts can serve as judges, mentors, speakers and more.
- Employees can sign up to participate at stem.inl.gov.



U.S. Department of Energy National Laboratories



National Laboratory Education Directors



Coordinate cross-complex STEM education activities that advance STEM outreach, K-12, university and workforce development programming related to the DOE lab missions with the goal of achieving inclusion, equity and diversity within the laboratory complex.

Opportunities to share and collaborate

A screenshot of the NIST website. The header includes the NIST logo, "Information Technology Laboratory / Applied Cybersecurity Division", a search bar, and a menu icon. The main content area is titled "NICE" and "K12 Cybersecurity Education Community of Interest". A sidebar menu lists: "About", "Community", "Community Coordinating Council", "Working Groups", "Communities of Interest", "Apprenticeships in Cybersecurity", "Cybersecurity Skills Competitions", "Diversity and Inclusion", and "K12 Cybersecurity Education". The "Focus:" section contains the text: "This Community of Interest is a forum for K12 teachers, school administrators, local and state education agencies, non-profit organizations, federal agencies, institutions of higher education, and others who are interested in sharing and learning how to grow and sustain diverse students pursuing cybersecurity careers through learning experiences, exposure to career opportunities, and teacher professional development. The new K12 Cybersecurity Education Community of Interest charter is available [here](#)."

Existing Resources and Tools

CYBER.ORG
THE ACADEMIC BRANCH OF THE CYBER INNOVATION CENTER

About Us Initiatives Families Car

Empowering Educators to Teach Cyber

CYBER.ORG believes K-12 cyber education is the key to solving the cyber workforce shortage.

Our Impact

About Us



“Cyber Discovery Kit”

Teach Cyber-Cyber Discovery Kit



The new Cyber Discovery Kit is available for download as a pdf. Our mission at Teach Cyber is to provide resources, training, and support ethically in cyberspace.

The Cyber Discovery Kit serves as an introduction for students to LIVE (Learn, Investigate, Value, and Empower) Cyber. The 8 Big Ideas explore key principles and concepts and investigate cybersecurity vocabulary and careers. The purpose is to help students discover

The kit is designed for 6th to 9th grade students in a club or classroom setting to heighten interest in your cybersecurity course, pri

Contact sabrina.smiley@teachcyber.org if you have questions.

Download

Existing Resources and Tools

CLARK

high school

CAE IN CYBERSECURITY COMMUNITY

HOME ABOUT US NEWS EVENTS CA

About CLARK Collections Resources Topics

FILTERS Clear all filters RESULTS (65) Clear Search

Collection

Length

Topic

Type of Material

Level

- Elementary
- Middle
- High
- Undergraduate
- Graduate
- Post Graduate
- Community College
- Training

Guidelines

Introduction to Cybersecurity Student Clubs
NANOMODULE UP TO ONE HOUR
Gencyber at NSA and 1 more
Updated Nov 17, 2021
Lesson plan designed by Tobi West at Coastline Community College

Cyber Operations Competition II
UNIT OVER 10 HOURS
John Franco at University of Cincinnati
Updated Sep 15, 2023
iWars is a team competition that is intended to enhance cybersecurity awareness and skills among high school students.

Hacking Ethics (WyCS)
NANOMODULE UP TO ONE HOUR
Gencyber at NSA
Updated Sep 17, 2021

K-12 PATHWAY PROGRAM: RING

RING | REGIONS INVESTING IN THE NEXT GENERATION

Leading Institutions: The University of Alabama Huntsville, Moraine Valley Community College

What is RING?
RING (Regions Investing in the Next Generation) is an online high school cybersecurity course that offers interesting and engaging content to students in participating states. RING aims to mentor students down their career path, instilling ethics and pride in their career path. RING is more than a collection of labs and presentations—it's forging the tools that will shape the next generation of cybersecurity experts.

- Students can achieve high school credit for RING in participating states.
- Students can engage with each other and network with cyber professionals through the RING student organization.

We are currently offering the following course options for 2024-2025:

- **Spring 2024** (Jan 2024 - May 2024) *fast-paced course
- **Summer 2024** (May 2024 - August 2024) *fast-paced course
- **Full Academic Year** (Aug 2024 - May 2025) *recommended for most students

Show me the money!!

Cybersecurity is one of the top 20 fastest growing fields in the country.

As of 2022. Cybersecurity professionals earn a median salary of **\$112,000** according to U.S. Bureau of Labor.

Currently, there are over 660,000 open cybersecurity positions available in the U.S.

Six career paths, with the years in school required to begin those career paths and their average starting salaries.

Career Path	Years in School	Average Starting Salary
Electrician	6 months – 2 years	\$55,000
Liberal Arts	4 years	\$40,000
Business	4 years	\$61,000
Cybersecurity	4 years	\$116,000
Software Development	2 years	\$70,000
Lawyer	7+ years	\$70,000
Doctor	10+ years	\$208,000

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Vulnerability Assessment Analyst

Type: Career

Degree Required: Degree

Not Required

Median Salary Range:

\$75,000

Job Growth: +20%



Multi-Disciplined Language Analyst

Type: Career

Degree Required:

Bachelor's Degree Required

Median Salary Range:

\$55,000

Job Growth: 42%



System Testing and Evaluation Specialist

Type: Career

Degree Required: Degree

Not Required

Median Salary Range:

+\$47,000

Job Growth: +20%



Cyber Forensics Expert

Type: Career

Degree Required:

Bachelor's Degree Required

Median Salary Range:

+\$70,000

Job Growth: +28%

Common Themes

- Creativity
- Inspiration
- Innovation
- Persistence
- Critical Thinking
- Multi-Disciplinary
- Communication
- Logic
- Teamwork



Gamification & Competitions

CYBERSTART

Features Guardians Educators Pricing About Sign in

Cyber security training brought to life through real-world hacking challenges and puzzles

Try for free

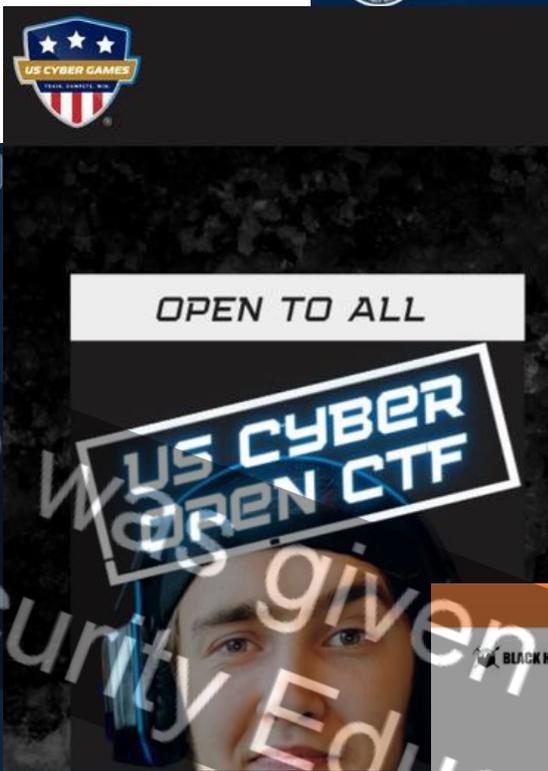
12 free challenges to play right now. No upfront payment.



US CYBER GAMES

OPEN TO ALL

US CYBER OPEN CTF



REGISTER COMPETITION AFA CYBERCAMPS CYBERGENERATIONS

EDUCATION INITIATIVE (ESCE) CYBERPATRIOT LITERATURE SERIES MEDIA

CYBERPATRIOT: Register for CyberPatriot XVI More Info »

XXVI

CYBERPATRIOT

XXVI

REGISTRATION NOW OPEN

Register by July 1 for a 20% discount

Join us in October for our conference, Wild West Hackin' Fest!



UTSA The University of Texas at San Antonio

CIAS

Research Competitions Training Info Sharing News Our Story



Cyber Threat Defender

BLACK HILLS Information Security

About Us Contact Services Projects/Tools Learn Community Training

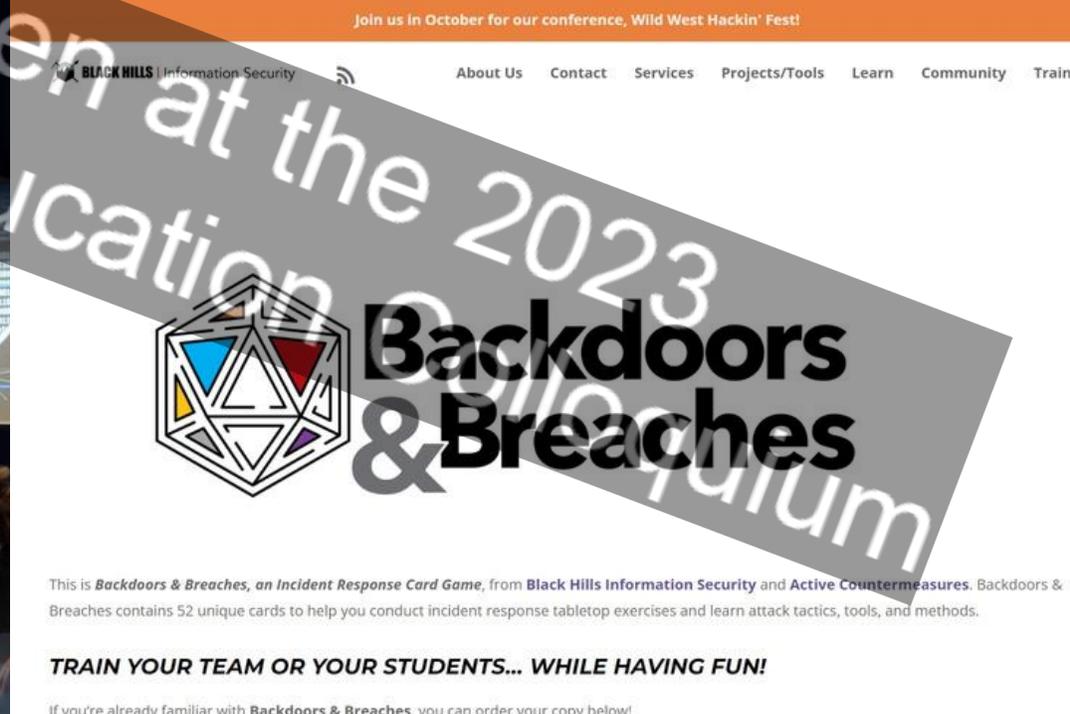
Backdoors & Breaches

Incident Response Card Game

This is *Backdoors & Breaches*, an Incident Response Card Game, from Black Hills Information Security and Active Countermeasures. Backdoors & Breaches contains 52 unique cards to help you conduct incident response tabletop exercises and learn attack tactics, tools, and methods.

TRAIN YOUR TEAM OR YOUR STUDENTS... WHILE HAVING FUN!

If you're already familiar with *Backdoors & Breaches*, you can order your copy below!



State Models and Approaches

K-12 EDUCATION

North Dakota Mandates CompSci, Cybersecurity Education

The new legislation, slated to take effect in 2025, will add graduation requirements, provide for the training and certification of teachers and make technology courses available to adult education outlets.

The screenshot shows the top navigation bar of the Cyber Florida website with links for 'ABOUT US', 'EDUCATION + TRAINING', 'OUTREACH + RESOURCES', and 'RESEARCH + GRANTS'. Below the navigation is a large hero image of a young girl looking at a laptop. To the right, there is a prominent graphic for 'OPERATION K12' with the subtext 'POWERED BY CYBER FLORIDA'. Below this graphic, a text block reads: 'A comprehensive program to infuse cybersecurity awareness and career preparation throughout Florida's public schools'.

The screenshot displays the CyberTexas Foundation website. The top navigation includes 'ABOUT', 'ACADEMICS', 'NEWS & EVENTS', 'WORK OPPORTUNITIES', 'CYBERPATRIOT', and '2023 SAN ANTONIO MAYOR'S CYBER CUP'. The main content area features a large image of a man in a suit and a woman speaking into a microphone. The text reads: 'CyberTexas Foundation' and 'Dedicated to the Advancement of Cybersecurity Education in Texas'. There are two buttons: 'Join us' and 'Learn More'. The background has a faint watermark that says 'This presentation was given at the 2023 National Cybersecurity Education Colloquium'.

The screenshot shows the Cyber Wyoming Alliance website. The top navigation bar contains 'FIND YOUR PROGRAM', 'BECOME A MEMBER', 'HAPPENINGS', 'ABOUT', and 'CONTACT'. Below the navigation is a collage of photos of students. The main heading reads: 'Connected Community, Secure Together'. On the right side, there is a 'RECENT ARTICLES' section with two entries: 'Lauren P Miller Scholarship Awarded to Cybersecurity Apprentice' dated August 22, 2023, and 'Cyber-in-a-Box School Video Challenge!' dated August 10, 2023.

CAE Model for K-12??



National Security Agency/Central Security Service

[About](#) [Press Room](#) [Careers](#) [History](#)

National Centers of Academic Excellence in Cybersecurity

WATCH AN NCAE STORY

Call to Action – How can we do better together?



- Bridging the gap
- Communicating and coordinating efforts
- Sharing best practices and lessons learned
- Working from the ground up as well as leveraging existing resources to make applicable for learners at any age
- Finding innovative ways to integrate cyber learning into the classroom – can not keep asking more of teachers
- Other ideas??



This presentation was given at the 2023
National Cybersecurity Education Colloquium

Idaho National Laboratory