exploreCyber

Cybersecurity, AI, and You

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About NCyTE

- National Science Foundation (NSF) funded center for cybersecurity education for more than 10 years
- One of 27 NSF funded Advanced Technical Educational (ATE) Centers
- Latest funding: $7.5M over five years
- Supporting nearly 70 distinct activities

- **Mission**: Increase the quantity and quality of the cybersecurity workforce throughout the nation

NCyTE CENTER

National Cybersecurity Training & Education Center

https://www.ncyte.net/

About NCyTE – Four Principal Goals

Goal 1:
Expand cybersecurity education pathways and program diversity to meet the nation's cybersecurity needs of tomorrow.

Goal 2:
Develop and deploy leading edge cybersecurity curriculum.

Goal 3:
Cultivate industry engagement and career opportunities.

Goal 4:
Disseminate efforts to improve current and future directions of cybersecurity education in the U.S.

https://www.ncyte.net/

Cybersecurity Workforce Gap

- **Severe Workforce Shortage**: There are an estimated 4 million unfilled cybersecurity jobs globally, with over 500,000 vacancies in the U.S. alone.
- **Rising Demand**: Cybersecurity job growth is projected to increase **35% from 2021 to 2031**, significantly outpacing the average job growth rate (Bureau of Labor Statistics).
- **Increasing Cyber Threats:** The rapid rise of cybercrime, ransomware, and nation-state attacks has heightened the need for a skilled cybersecurity workforce.
- **Shortage of Qualified Professionals:** Many job applicants lack the necessary hands-on skills, certifications, and specialized training required to meet industry demands.
- **Continues to Hold National Attention:** White House Office of the National Cyber Director (ONCD)

Where Do You Fit In?

- You do **not** need to be a cybersecurity major.
- Cyber roles exist for:
  - Computer science students
  - Data / AI students
  - Engineering students
  - All students!
- Cybersecurity is a **layer on top of what you already know**

Some Things I Want You to Know About Cybersecurity

Correct misconceptions

Cybersecurity isn't too technical and doesn't happen dispel the notion that cybersecurity is too technical

Understand the value of cybersecurity certifications

Providing information of key industry certifications (e.g., CompTIA Security+) and insights into the relevance of certifications at different career stages

Become aware of extracurricular activities

Create awareness on competitions, clubs, internships, apprenticeships, and other volunteer opportunities in cybersecurity that will build cybersecurity skills

Build confidence and self-efficacy

Enhance their knowledge and confidence in advising on cybersecurity careers and skills, simplifying and explaining roles to inspire career exploration

What is cybersecurity?

- protecting information, information systems, networks, devices, and data from unauthorized access and digital attacks.

Cybersecurity professionals:

- are responsible for ensuring **confidentiality, integrity, and availability** of systems and information.

- Every app you build needs security
- Every AI model you train has risk
- Every system you design can be exploited

CIA Triad

Cybersecurity protects:

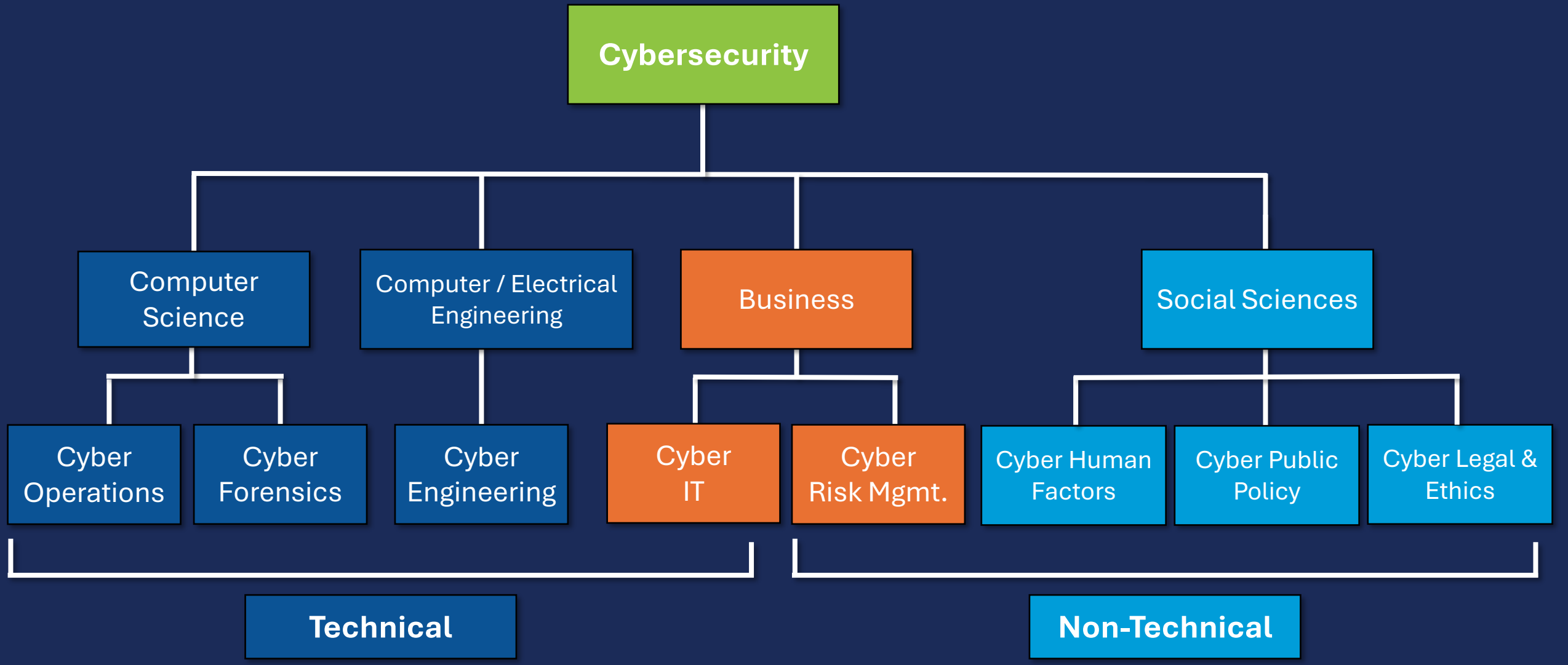
- **Confidentiality**
  Protecting information from unauthorized access

- **Integrity**
  Ensuring data accuracy and preventing unauthorized modification

- **Availability**
  Ensuring systems and data are accessible when needed

Cybersecurity & You

What You're Learning	Cybersecurity Connection
Programming	Secure coding, vulnerabilities
Databases	Data protection, breaches
AI/ML	Model security, bias, attacks
Networking	Threat detection
Systems	Hardening and defense



Source: Dr. Seth Hamman

Interdisciplinary Demand for Cybersecurity Skills

- **Cyber touches every field**: healthcare, law enforcement, agriculture, education, and manufacturing
- **Smart devices + data = growing risk across all sectors**
- **Professionals need cyber awareness**, not just cyber specialists
- Employers want **job-ready workers** with both technical and domain-specific knowledge

NICE Cybersecurity Work Role Categories

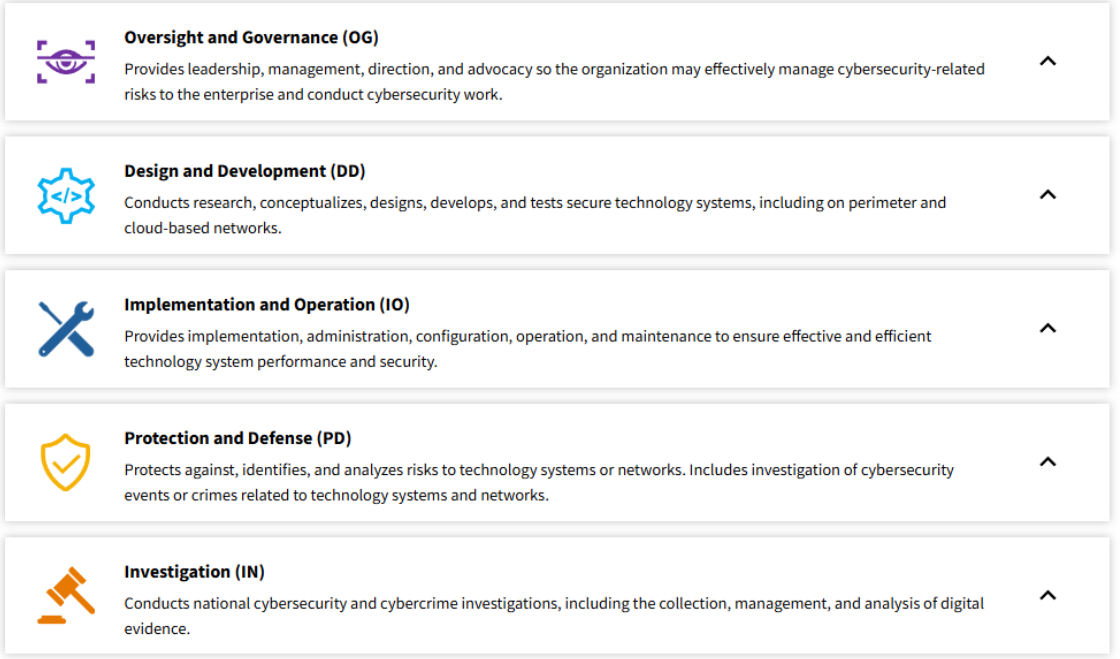
The NICE Framework includes the following components:

Work Role Categories: A high-level grouping of common cybersecurity functions.

Work Roles: A grouping of work for which someone is responsible or accountable. Please note, Work Roles are not synonymous with job titles or occupations.

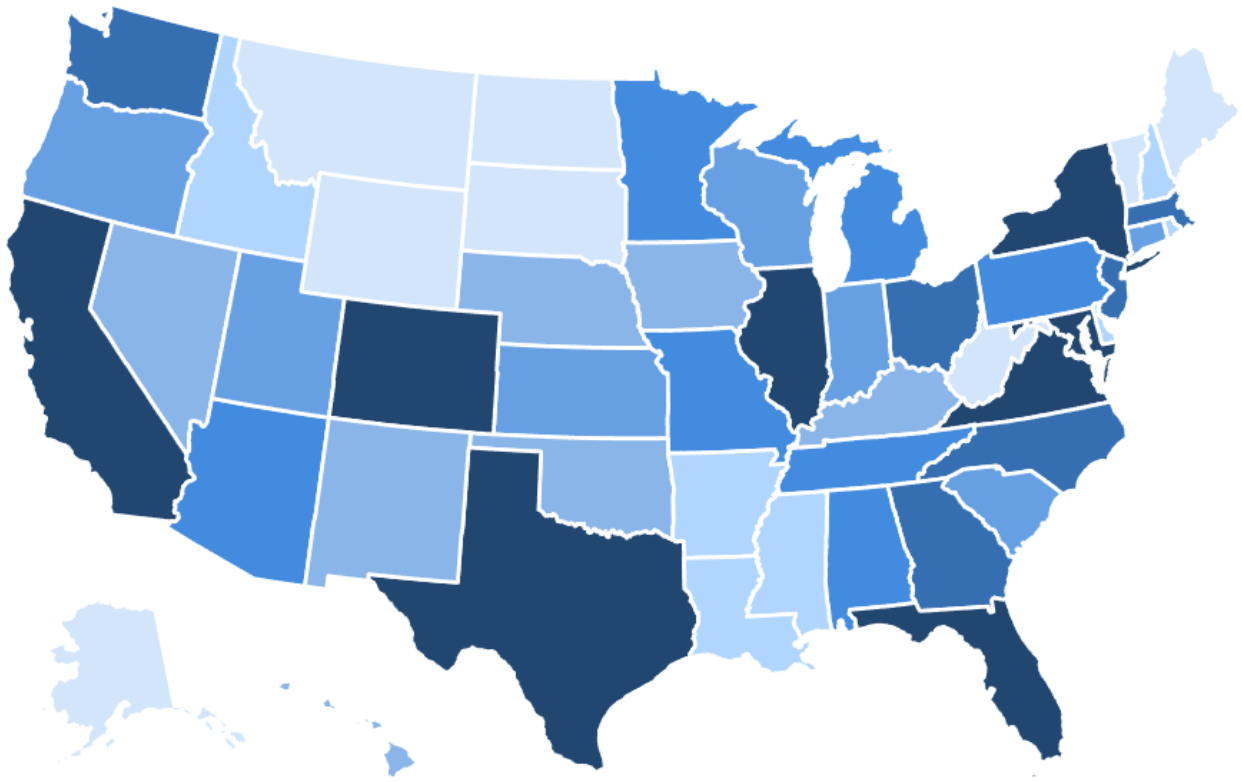
TKS Statements: A set of discrete building blocks that describe the work to be done (in the form of Tasks) and what is required to perform that work (through Knowledge and Skills).

Competency Areas: Clusters of related Knowledge and Skill statements that correlate with one's capability to perform Tasks in a particular domain.



Source: https://niccs.cisa.gov/tools/nice-framework

CyberSeek Heat Map & Career Pathways



Supply vs. Demand Ratio

The percentage shows the available cybersecurity workers relative to employer demand.

National average

74%

NATIONAL, 2025

Total Online Job Openings

Job postings for cybersecurity-related positions

514,359

NATIONAL, 2025

Total Employed Workforce

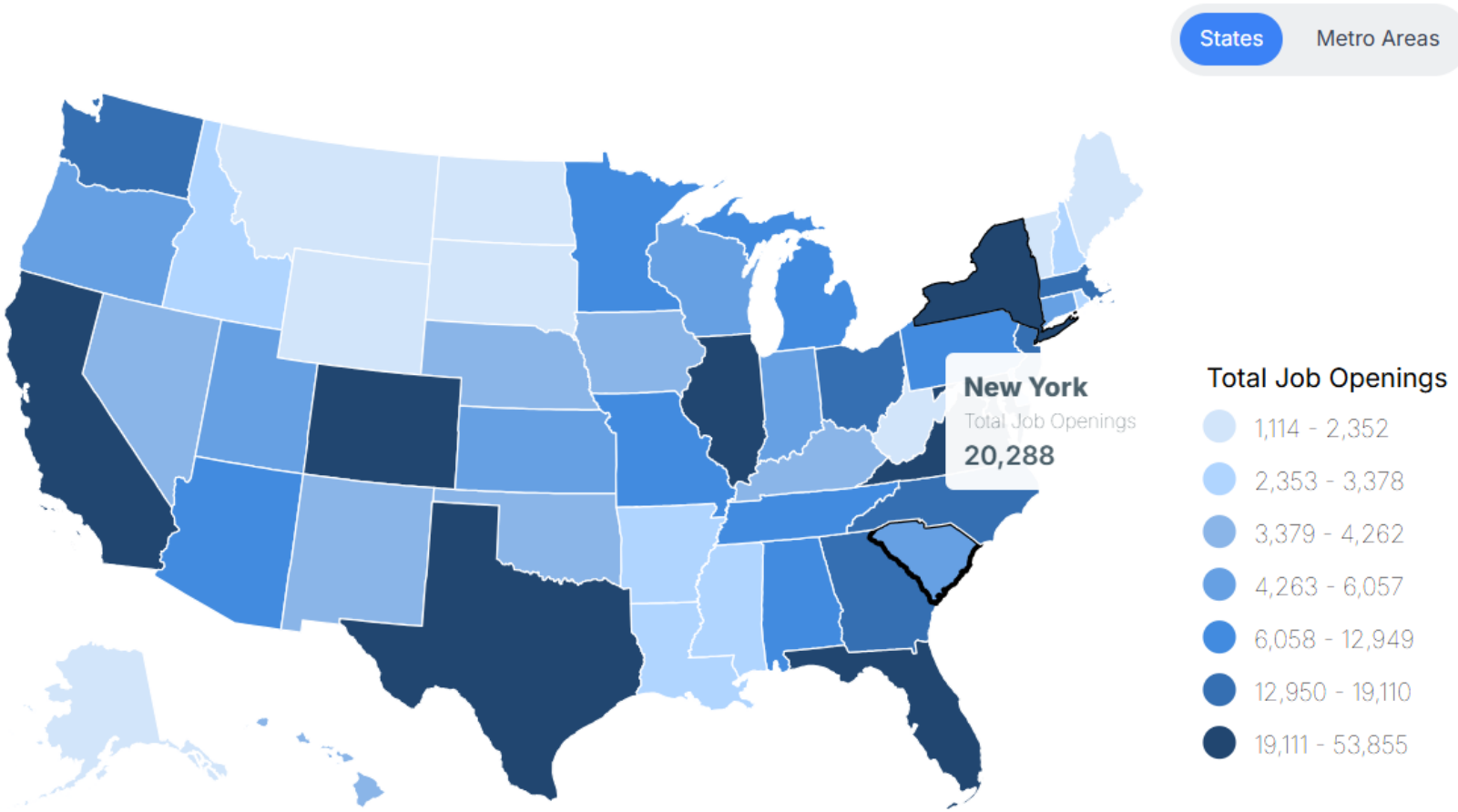
Estimated number of workers employed in cybersecurity-related jobs

1,337,400

NATIONAL, 2025

https://www.cyberseek.org/

CyberSeek Heat Map: South Carolina



Supply vs. Demand Ratio

The percentage shows the available cybersecurity workers relative to employer demand.

National average

76%

SOUTH CAROLINA, 2025

Total Online Job Openings

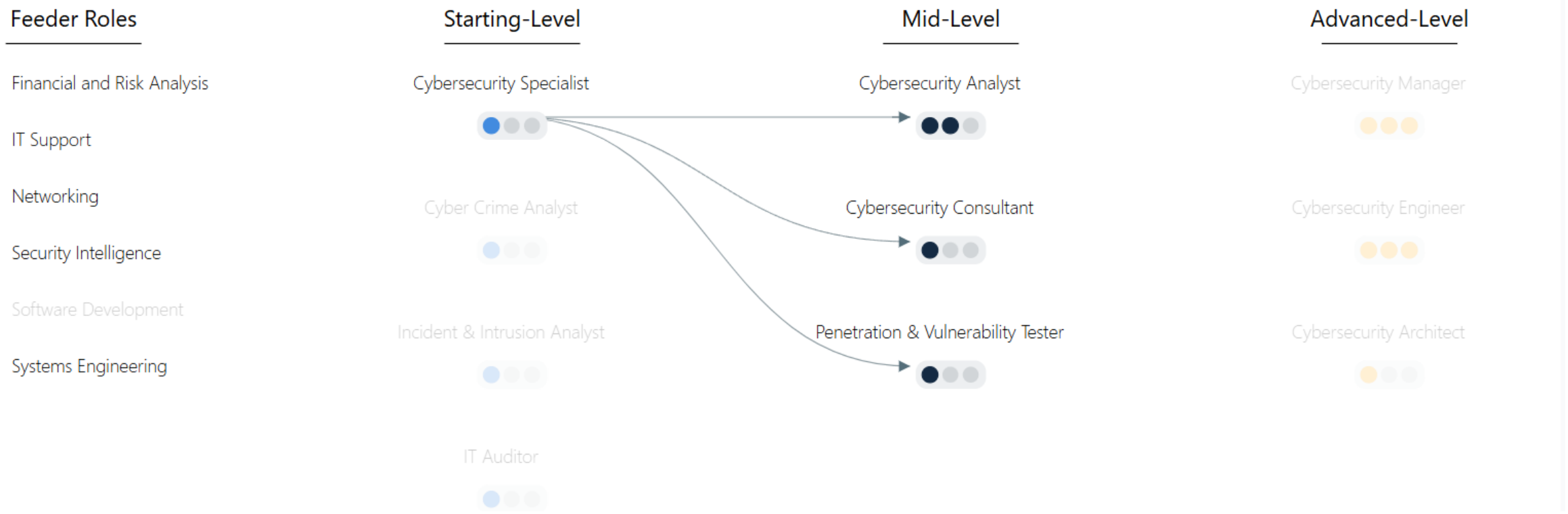
Job postings for cybersecurity-related positions

5,800

SOUTH CAROLINA, 2025

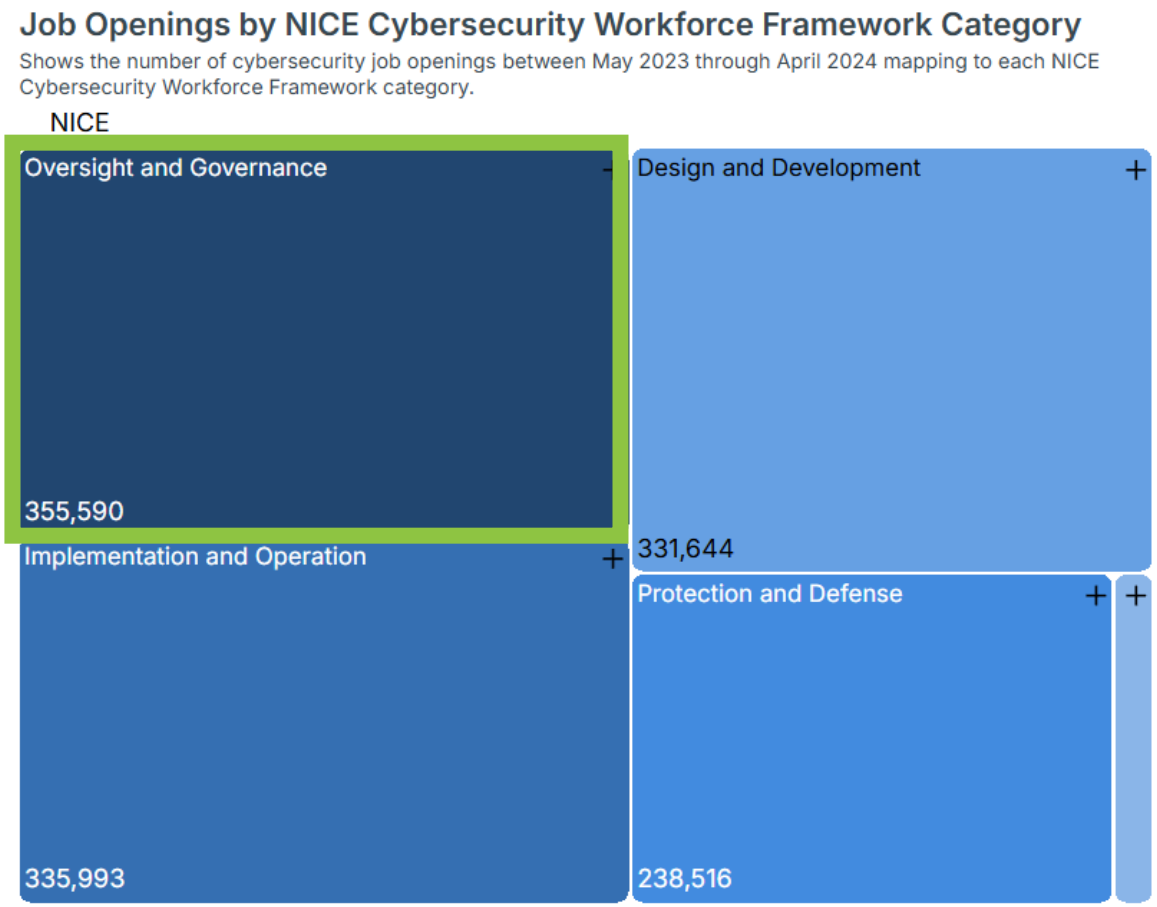
https://www.cyberseek.org/

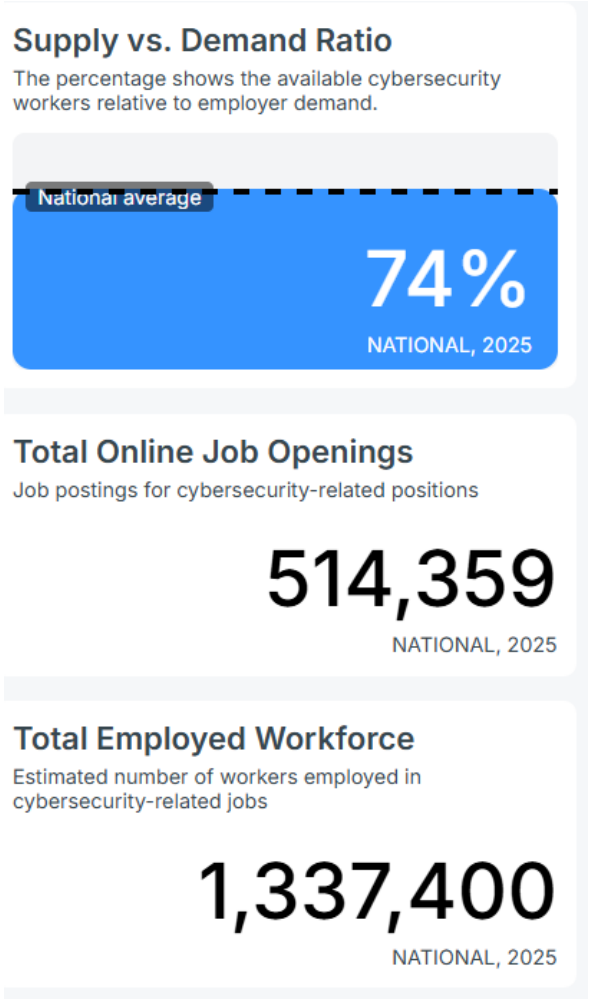
CyberSeek Career Pathways



https://www.cyberseek.org/

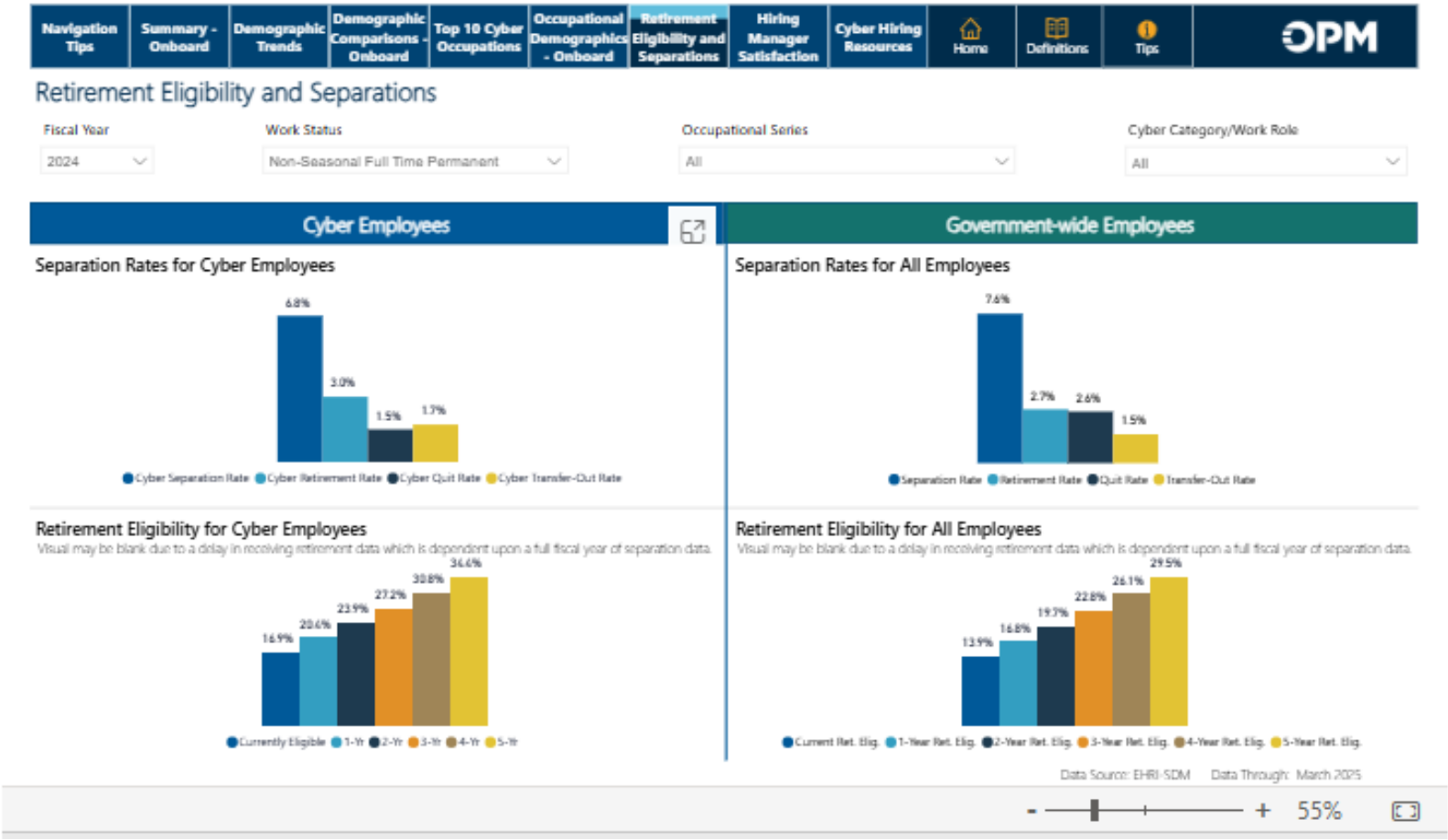
CyberSeek: Highest Job Vacancies by Category





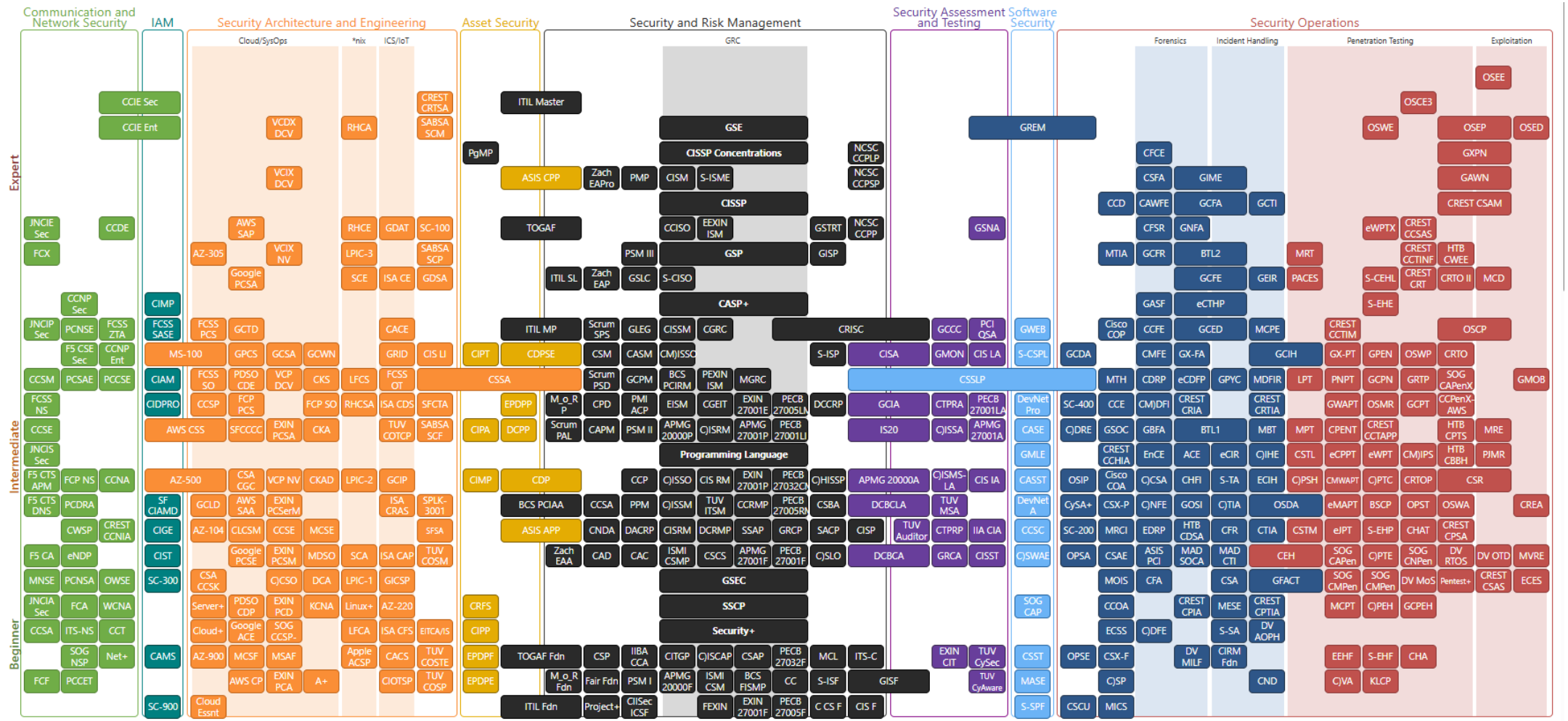
https://www.cyberseek.org/

OPM Cyber Workforce Dashboard



https://www.opm.gov/data/data-products/cyber-workforce-dashboard/

Industry Certification Roadmap



https://pauljerimy.com/security-certification-roadmap/

DoW Cyber Workforce Framework (DCWF)

The seven Cyberspace Workforce Elements are:

https://www.cyber.mil/dod-workforce-innovation-directorate/dod-cyber-workforce-framework

Cybersecurity Career Areas & Student Interests

Career Area	What They Do	Ideal For Students Who…
Security Analyst	Monitor systems and respond to incidents	Like problem-solving, puzzles, and patterns
Penetration Tester (Ethical Hacker)	Test systems to find vulnerabilities	Enjoy challenges, games, or “catching the bad guy”
Cyber Forensics Specialist	Investigate breaches and gather digital evidence	Like criminal justice or investigative work
Network Defender	Protect systems from attacks and maintain security tools	Are detail-oriented and technical
Risk Analyst / Policy Specialist	Evaluate risks, write policies, ensure compliance	Enjoy writing, communication, or law
Security Engineer / Architect	Design and build secure systems	Like designing, planning, and building
Cyber Educator / Trainer	Teach or train others in cybersecurity	Like mentoring and helping people learn

Personality Exploration & Work Role Matcher

https://i.explorecyber.org/

Emerging Cybersecurity Fields

- **AI and Cybersecurity** – protecting AI systems and data
- **Industrial / Critical Infrastructure Security** – protecting factories, energy grids, and hospitals
- **Privacy and Compliance** – working with laws and data protection (great crossover for students interested in law or policy)
- **Cloud Security** – securing data stored in the cloud
- **Space Cybersecurity** – securing satellites and aerospace systems

Cal Poly California Cybersecurity Institute (CII)
Space Grand Challenge

https://sgc-sandbox.cacyber.net/

National Centers of Academic Excellence (CAE) in Cybersecurity

CAE IN CYBERSECURITY COMMUNITY

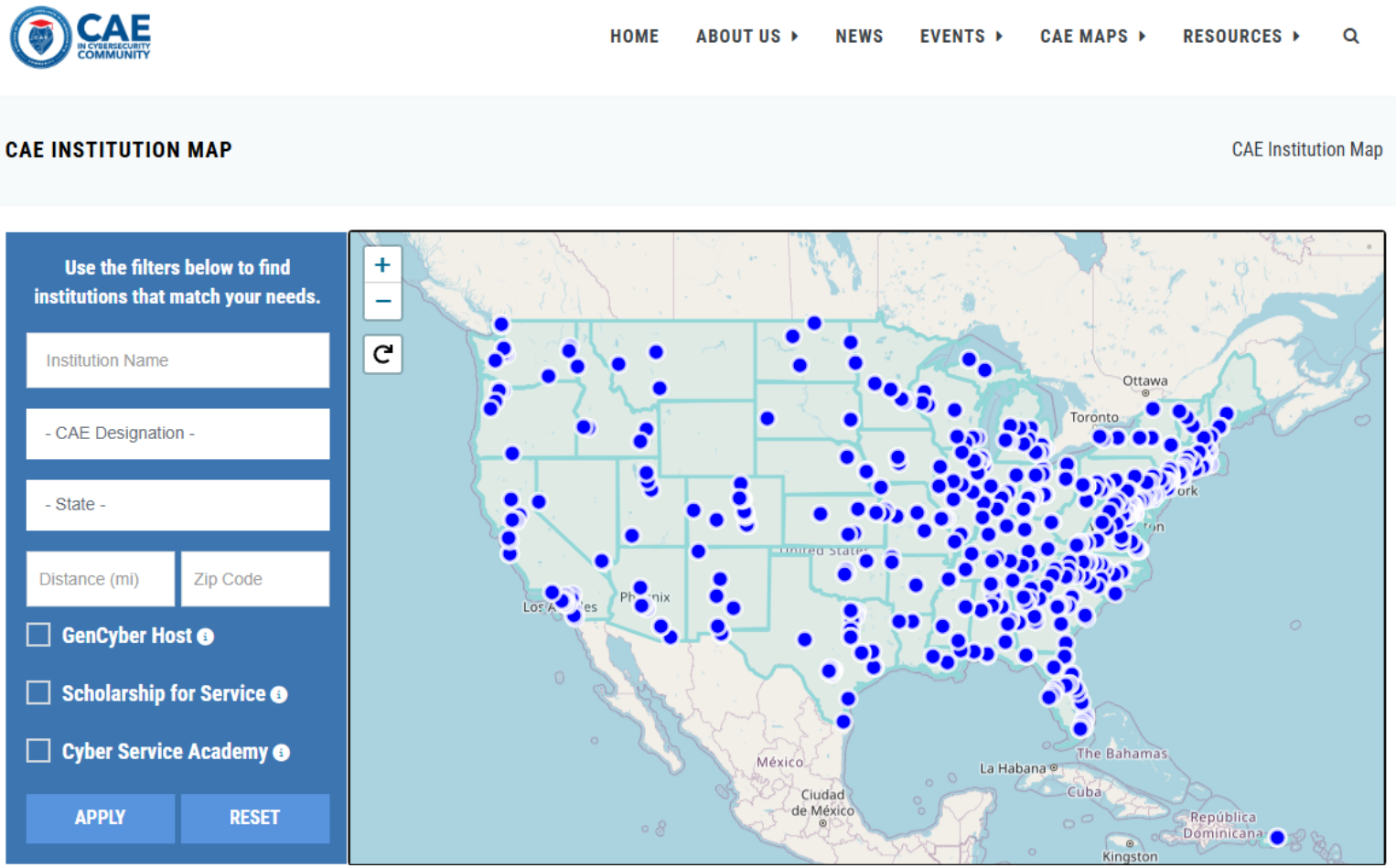
CAE-C Designations

- Are regionally accredited institutions offering cybersecurity-related degrees, including majors, minors, and/or certificates at the Associates, Bachelor's and graduate levels.

- The Institution must demonstrate it:
  - Engages in significant community involvement, academic activities, and instructional practices in cybersecurity
  - Has one or more Program(s) of Study (POS) meeting the requirements set forth by the National Security Agency (NSA)
  - Promotes and supports quality academic programs of higher learning that help produce the nation's cyber workforce.

CAE IN CYBERSECURITY COMMUNITY

CAE Community Map



https://maps.caecommunity.org/

Cybersecurity Scholarship Programs & Extracurricular Activities

Cybersecurity Scholarship Opportunities

- **CyberCorps: Scholarship for Service**
  http://sfs.opm.gov

CyberCorps®
Defending America's Cyberspace

- **Department of War Cyber Service Academy**
  https://www.cyber.mil/dod-workforce-innovation-directorate/csa/

FOREIGN AFFAIRS IT Fellowship

- **Foreign Affairs Information Technology Fellowship**
  https://www.faitfellowship.org/
- **Diplomatic Technology Officer Career:**
  https://www.faitfellowship.org/dto-career/

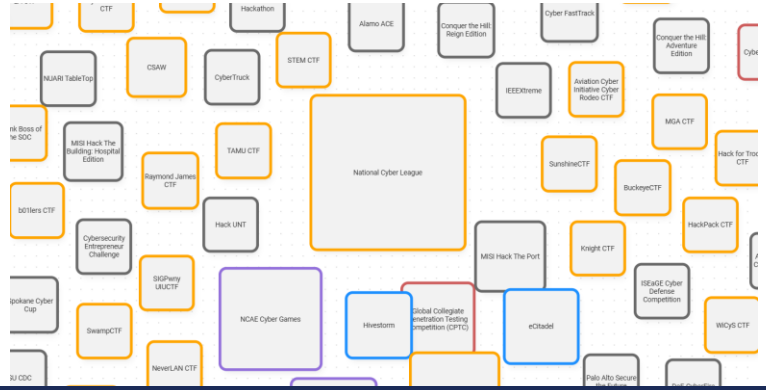
Cybersecurity Activities & Competitions

https://www.xpcyber.com/

https://trycyber.us

https://nationalcyberleague.org

https://www.ncaecybergames.org/



https://cyber-atlas.caecommunity.org/

Extracurricular Activities & Competitions

https://www.netacad.com/

women in CYBERSECURITY WiCyS

https://www.wicys.org/

CYBERSECURITY & INFRASTRUCTURE SECURITY AGENCY CISA

https://www.cisa.gov/careers/work-rolescyber-and-it-interns

Microsoft Learn: Free Courses with Badging

4500 XP

Describe the concepts of cybersecurity

2 hr 17 min • Learning Path • 0 of 6 modules completed

At a glance

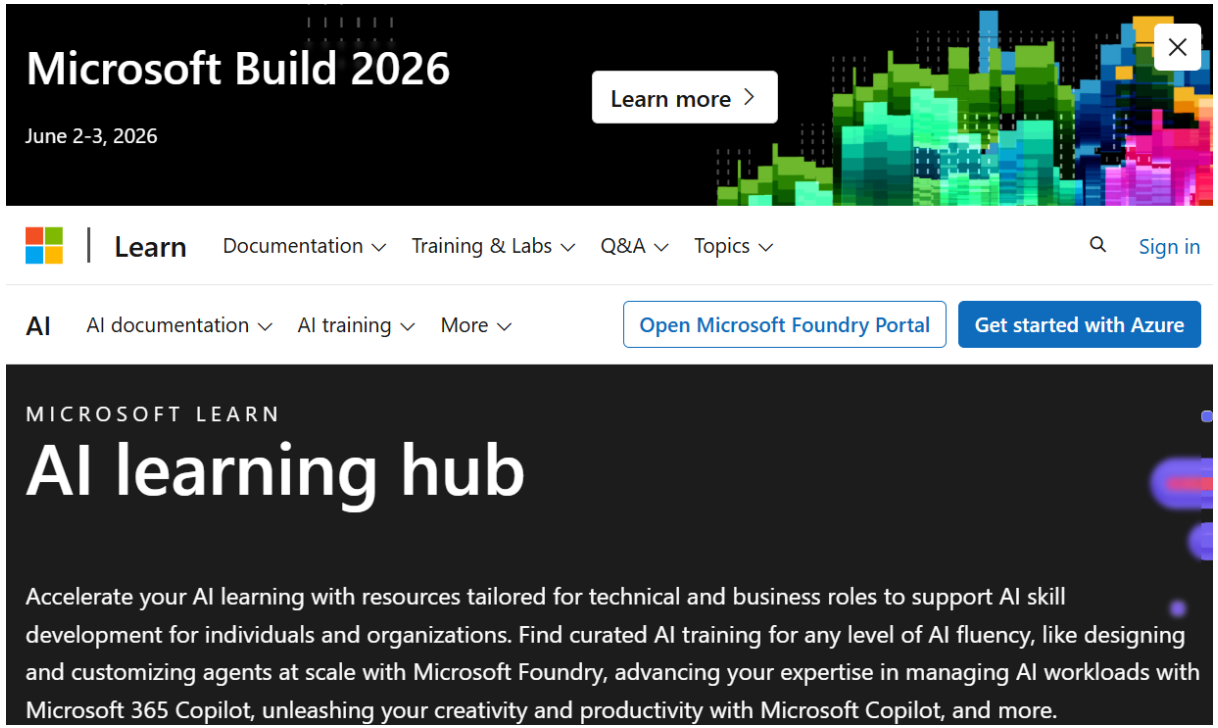
Level
Beginner

Product
Azure, Microsoft 365

Role
Business Owner, Business User, Student

Subject
Security

Knowing the fundamentals of cybersecurity is a first step toward protecting against cyberthreats. In this learning path you will learn about cybersecurity concepts and ways to protect yourself and your business from cyberattacks.

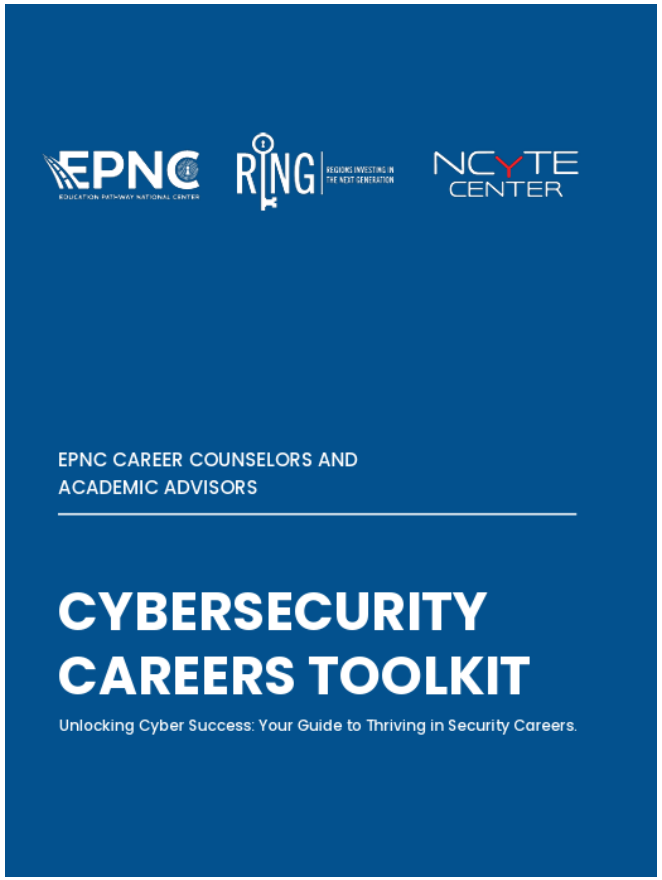


https://learn.microsoft.com/en-us/training/paths/describe-basic-concepts-of-cybersecurity/

Creating Awareness:

Cybersecurity Careers Toolkit

- **Career Guide** – Supports counselors and advisors in guiding students into cybersecurity careers.
- **Education Pathways** – Covers degrees, certifications, and scholarships.
- **Career Tools** – Features NICE & DCWF Frameworks, CyberSeek, and CYBER.ORG resources.
- **Hands-on Experience** – Highlights competitions and workforce readiness programs.



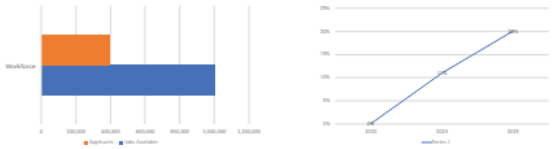
Creating Awareness: Cybersecurity Career Pathways Toolkit

DEFINING AND UNDERSTANDING THE

CYBERSECURITY WORKFORCE

The cybersecurity occupation is still a relatively new profession. However, this profession has grown exponentially over the last 20 years.

More than one million cybersecurity jobs will be available by 2023, but less than 400,000 cybersecurity professionals will be trained by then. Cybersecurity is an ever-growing industry. It is projected to grow by 11% in 2023 and by 20% in 2025. This is a fast-paced career with a median salary of $81,000.



The shortage of qualified professionals is largely due to the rapidly growth for new professionals as well as the growing cyber threats. By prioritizing and promoting cybersecurity careers, career and academic advisors help the nation and the local communities mitigate the risk of data breaches, financial losses, and interruptions to critical business operations and supply chains.

https://www.youtube.com/watch?v=wV2jmlS3oNE

ACTIVITY 1 – EXPLORING CYBERSECURITY CAREERS

Activity one provides an opportunity for participants to explore Cybersecurity Careers using several of the Cybersecurity Careers Toolkit for career Counselors and Academic Advisors. The activity will introduce three toolkit recourses:

1. Workforce Framework for Cybersecurity (NICE Framework)
2. Cyber Careers Pathways Tools
3. Cybersecurity for Students (NICCS Portal)

EXPLORING CYBERSECURITY CAREERS

PART 1 - GO TO THE FOLLOWING URL:

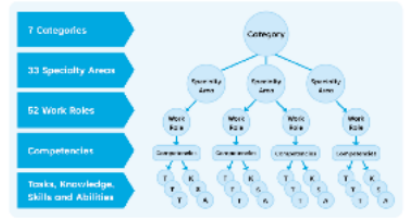
http://niccs.cisa.gov/workforce-development/nice-framework

The National Initiative for Cybersecurity Education (NICE) is a framework that assist employers, government agencies and academy in developing a robust pipeline of cybersecurity professionals. The framework organizes the cybersecurity workforce into an understandable framework. The framework consists of:

- Categories and Specialization Areas or Work:
- Specific Work Roles
- Associates Task, Knowledge, Skills, and Abilities

7 CATEGORIES OF WORK

STRUCTURE OF THE FRAMEWORK



COMPETENCY EDUCATION – *RESOURCES*

Workforce Framework for Cybersecurity (NICE Framework)

The NICE Framework establishes a common lexicon to describe cybersecurity work and workers regardless of where or for whom the work is performed.

niccs.cisa.gov/workforce-development/nice-framework

Cyber Career Pathways Tool

Interactively explore the NICE Cybersecurity Workforce Framework according to fivedistinct skill communities and attributes for 52 work roles.

niccs.cisa.gov/workforce-development/cyber-career-pathways-tool

Cybersecurity for Students

Find resources and information for cybersecurity students, including education and training opportunities in the field.

niccs.cisa.gov/education-training/cybersecurity-students

CAE Institution Map

The CAE Institution map showcases the locations of CAEs designated by the NSA and the DHS in the field of cybersecurity education.

caecommunity.org/cae-map

Cyber.org - Career Profiles

Cyber.org provides an overview of various cyber career profiles, offering information and insights into different roles within the cybersecurity field.

cyber.org/career-exploration/cyber-career-profiles

Cyber Seek - Heat Map and Pathways

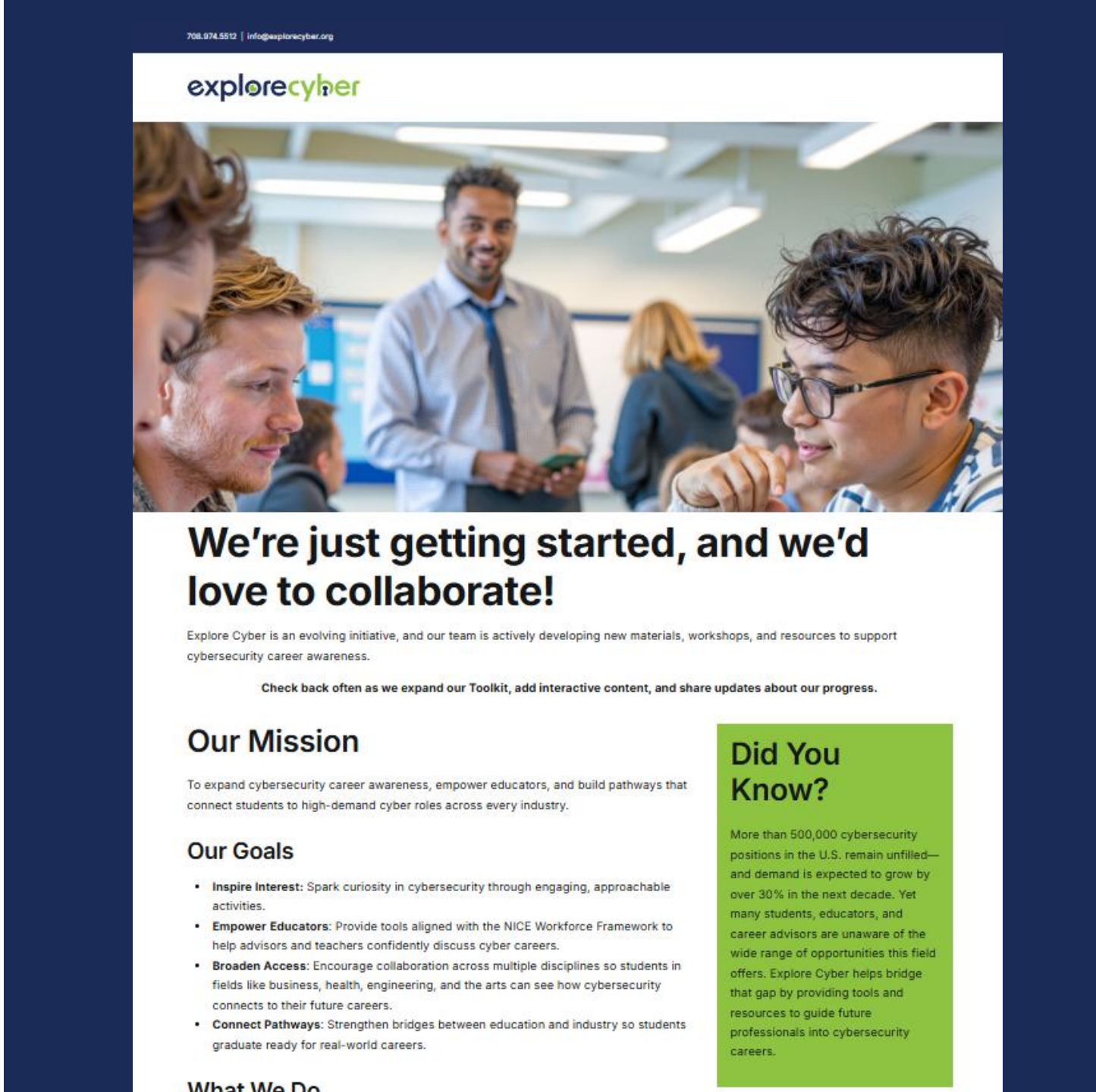
Cyber Seek provides interactive tools and data to explore cybersecurity job demand, skills, and career pathways in the United States.

www.cyberseek.org/index.html

Our Website

explorecyber

https://www.explorecyber.org/



Personality Exploration & Work Role Matcher

https://i.explorecyber.org/

First Steps You Can Take

- Join a cybersecurity club or event
- Try a CTF
- Take one online module (Microsoft Learn fits perfectly here)
- Talk to a faculty member or advisor
- Explore one career pathway

NCyTE Community College Faculty Fellowship

Fellowship Information: https://www.ncyte.net/career-seekers/career-seeker-resources/fellowship-program

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Healthcare and Public Health Sector

- Protecting Lives and Medical Data
- **Critical Assets**: Hospitals, Acute Care Facilities, Pharmaceutical companies, Medical Device Managers, Emergency Medical Services

Sector Composition:

- 6,000+ hospitals in the United States
- 250,000+ healthcare facilities including clinics and nursing homes
- $4.3 trillion annual healthcare spending
- 18% of US GDP represented by healthcare

Common Attacks:

- **Ransomware** - Increasingly targets hospitals for maximum impact
- **Data theft** - PHI valuable on black markets
- **Medical device compromises** - Insulin pumps, pacemakers, imaging systems
- **Supply chain attacks** - Compromised medical software and devices

Healthcare and Public Health Sector

Cybersecurity Challenges:

- **Legacy Systems:** Medical devices designed for longevity, not security.
- **Availability Requirements:** Cannot take critical systems offline for updates.
- **Interoperability Needs**: Systems must communicate across organizations.
- **Regulatory Complexity:** HIPAA, FDA, and state requirements.
- **Resource Constraints:** Tight budgets limit security investments.

Case Study:

Yale New Haven Health Data Breach

- **What happened**: Sophisticated hackers gained unauthorized access to a network server, exposing demographic data for approximately **5.6 million patients:** names, DOBs, addresses, race/ethnicity, and medical record numbers
- **Why it matters**: 5.56 million patients affected: **largest healthcare breach of 2025**
- **Data compromised**: Names, addresses, SSNs, medical record numbers. *Protected Data***:** Medical records, financial information, treatment details
- **Key takeaway:** Lack of basic safeguards (e.g., segmentation, encryption) not only jeopardizes patient data but invites regulatory and legal consequences, plus severe reputational damage.

Case Study:

Ascension Health Ransomware Incident (2024)

- **What happened**: Ransomware attack by Black Basta (Russian), on May 8, 2024, crippled Ascension's digital systems across 140 hospitals, forcing manual paper-based operations – ambulance diversions and delayed care.
- **Cause:** Employee accidentally downloaded a malicious file thinking it was legitimate
- **Why it matters**: Electronic Health Records (EHRs) were inaccessible. Critical diagnostics (e.g., stroke CT scans) are delayed by hours, disrupting surgeries, pharmacy, radiology, and emergency services.
- **Data compromised**: Medical records, Social Security numbers, credit card info, insurance
- **Key takeaways:** Cybersecurity failures can **threaten lives**, not just data. Demonstrates how employee error can trigger massive operational disruption and the critical importance of cybersecurity training in healthcare

Resources for Health Science Classes

- **HHS 405(d) Program – Health Industry Cybersecurity Practices (HICP):**
  offers free downloadable playbooks, threat scenarios, and best practices
  https://405d.hhs.gov
- **Health Sector Cybersecurity Coordination Center (HC3):**
  Alerts, sector threat briefs, and trend analysis (e.g., ransomware, phishing, zero-days)
  https://www.hhs.gov/about/agencies/asa/ocio/hc3/index.html
- **Health-ISAC Threat Intelligence Reports:**
  https://h-isac.org

Interactives for Health Science Classes

- **Defend the Hospital (Incident Response)** https://cyberskillslive.com/activity/defend-the-hospital/
- **HackableHospital (Offensive):** https://www.hackablehospital.com/
- **Digital Care Hub (Leadership & Consequence Management Focused):** https://www.digitalcarehub.co.uk/digital-skills-and-training/cyber-game/

Our Website

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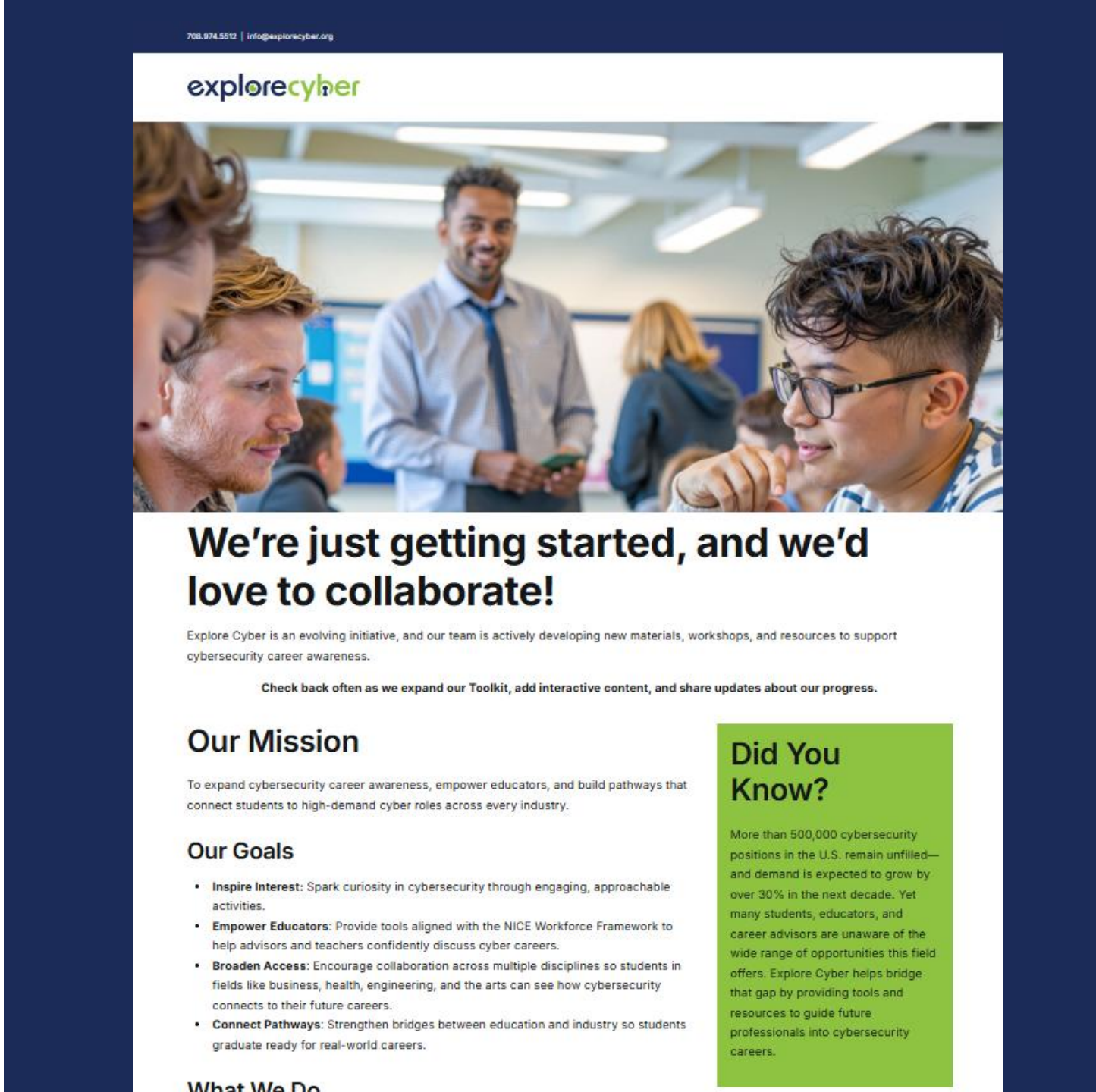
https://www.explorecyber.org/



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Thank You!

Let's Connect & Collaborate

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