



**ITEA 2016 Cyber Security Workshop  
Partnering with Industry and Academia**

**Cyber Security Capabilities and  
Collaboration Opportunities @ NSU**

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# Topics

- ❖ Norfolk State University Overview
- ❖ Cyber Security @ NSU Overview
- ❖ Cyber Security Education Programs
- ❖ Cyber Security Research Programs
- ❖ Cyber Security Outreach and Workforce Development Programs
- ❖ Cyber Security Facilities and Equipment
- ❖ Cyber Security Partnerships
- ❖ Cyber Security Collaboration Opportunities

# NSU Overview

- ❖ **Established in 1935**
- ❖ **Largest HBCU in Virginia**
- ❖ **Academic programs**
  - Three Colleges, five Schools, 27 academic departments
  - 1 associate degree, 30 bachelor's degrees, 16 masters degrees, 3 doctoral degrees
- ❖ **Enrollment (Fall 2015)**
  - Total student headcount: 5,107
  - Undergraduate headcount: 4,522, Graduate headcount: 585
  - Female: 64.3%, Male: 35.7%
  - Blacks: 83.0%, Whites: 5.1%, Others: 11.9%
- ❖ **Accredited by the Southern Association of Colleges and Schools**
  - NSU has also earned accreditation for every eligible program
- ❖ Located in Hampton Roads region with many large **DoD** bases/facilities and personnel

# CSET Profile

## NSU has significant strengths in STEM-H:

- ❖ 8 academic departments and **Army** and **Naval ROTC** programs
- ❖ Graduate programs
  - M.S. - Computer Science, Cyber Security, Electronics Engineering, and Materials Science
  - Ph.D. - Materials Science and Engineering
- ❖ Accredited programs
  - Chemistry
  - Computer Science
  - Engineering
  - Nursing
  - Technology
- ❖ Fall 2015 enrollment: 1,581



# Launching Cyber Security @ NSU

- ❖ **Institute for Information Assurance Research**  
established in 2003
- ❖ **M.S. in Computer Science** program started in **August 2003** with emphasis in Information Assurance
- ❖ **Information Assurance Techniques for a Simulated Large-Scale Battlefield Environment** award helped to launch cybersecurity research @ NSU
  - A cooperative agreement funded by **DoD** and managed by **Army Research Lab**
  - \$5.5 million for 5 years (2005-2010)
  - Multiple faculty and students involved in research

# Growing Cyber Security @ NSU

- ❖ **NSA/DHS CAE in IA Education** designation granted in **May 2009**
  - **Information Assurance Research, Education and Development Institute (IA-REDI)**
- ❖ Expanding cybersecurity education programs
  - CNSS 4011 Certificate in Information Systems Security
  - CNSS 4012 Certificate Senior Systems Manager
  - A new emphasis in Computer Science: **BS. CSC. IA**
- ❖ Broadening cybersecurity sponsored programs
  - Massie Chair of Excellence in Cybersecurity. NNSA. \$1.25M. 2009-2015.
  - Cybersecurity Workforce Development. NNSA. \$773K. 2012-2013.
  - **Self-Protecting Security for Assured Information Sharing. ARO.** \$487K. Feb 2012 - Feb 2015.
  - **Building a Cloud Computing and Big Data Infrastructure for Cybersecurity Research and Education. ARO.** \$497K. Feb 2014 - Jan 2015.
  - **DoD IASP. DoD.** \$269K. 2010-2014.
  - CyberCorps® SFS. NSF. \$1.2 million. 2011-2014.

# Strengthening Cyber Security @ NSU

- ❖ **NSA/DHS CAE in IA/Cyber Defense** designation granted for **2015-2020**
- ❖ Expanding cybersecurity education programs
  - **M.S. in Cybersecurity** (online) started in August 2015
  - Developing a **Cybersecurity Minor** for non-STEM majors
- ❖ Elevating level of capabilities for cybersecurity sponsored programs
  - **DoD IASP**. DoD. \$48K. 2015.
  - CyberCorps® SFS. NSF. \$473K. 2014-2017.
  - **Consortium for K-20 Cybersecurity Workforce Pipeline**. NNSA. \$25M. Five years (Oct 2014 - Sep 2019). **Lead: NSU**.
  - **Center of Excellence in Cyber Security**. DoD. \$4.98M. Five years (Apr 2015 - Apr 2020). **Lead: NSU**.

# Consortium for K-20 Cybersecurity Workforce Pipeline (DoE Supported)



- ❖ **Objective:** To develop a K-20 pipeline for producing well-qualified cyber security professionals in significant numbers to address cyber security workforce shortage
- ❖ **Partners** include
  - 13 HBCU
  - 1 school district (Charleston, SC)
  - 2 DoE national labs (SNL & LLNL)
  - **SPAWAR** (Charleston, SC)



# Center Of Excellence in Cyber Security (DoD Supported)

❖ **Cooperative Agreement** managed by **AFRL/Rome**

❖ Academic partners

- Norfolk State University (Norfolk, VA)
- Old Dominion University (Norfolk, VA)  
Virginia Modeling, Simulation and Analysis Center



❖ **Mission**

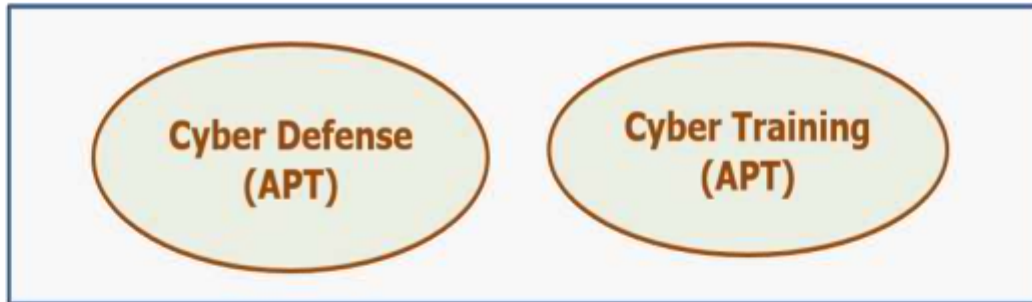
- Increase knowledge and application of cyber security based on multidisciplinary and collaborative research
- Increase capacity in research, education, and professional development for faculty and students

❖ **Objectives**

- Conduct basic research to develop a cloud-enabled, big-data-analytics-capable **Cyber Analysis, Simulation and Experimentation Environment (CASE-V)** for enhancing situational awareness and decision support for cyber defense and cyber training
- Perform research-related education and outreach activities

# COE Research Programs

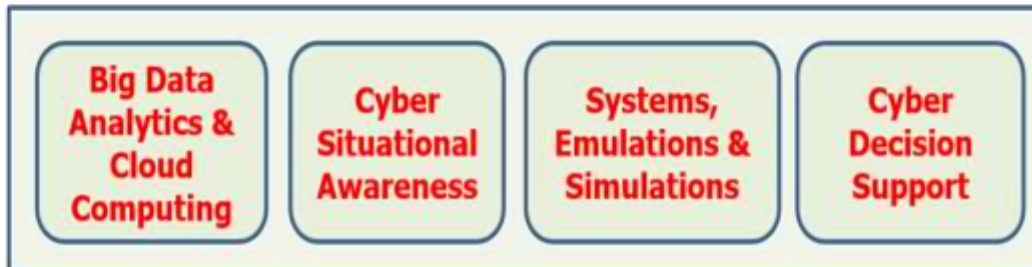
Applications



Platforms



Enabling Technologies



## ❖ Four research thrusts

1. Cyber intelligence and cyber defense
2. Cyber modeling, simulation, analysis and decision support
3. Cyber training, and intrusion detection and response
4. CASE-V framework and test bed

# COE Research Plans

- ❖ **Short-term research objectives** (12-18 months)
  - Scalable detection of APT
  - Human behavior modeling and simulation
  - Foundational APT kill-chain attack, defense and training scenarios
  - CASE-V platform technologies, integration and prototyping (v1)
- ❖ **Mid-term research objectives** (18-42 months)
  - Big data security analytics
  - Integrate L-V-C capabilities, and analysis/cognitive capabilities
  - Support advanced APT attack, defense, analysis and training scenarios
  - CASE-V Platform enhancement with big data & simulation capabilities (v2)
  - Host (controlled) events to gain experience & feedback
- ❖ **Long-term research objectives** (42-60 months)
  - Security metrics and situational response
  - Collaborative intelligence & interoperability with kinetic simulation systems
  - Comprehensive cyber defense and cyber training capabilities
  - CASE-V platform interoperability and app portability (v3)
  - Participate in joint or federated events

# Cyber Security Outreach & Workforce Development Programs

## ❖ COE in Cyber Security

- Summer internship at AFRL/Rome
- Summer internship at COE/NSU
- Faculty training workshop at COE/NSU
- Graduate and undergraduate research assistantship

## ❖ Consortium for K-20 Cybersecurity Workforce Pipeline

- Summer internship at DoE labs, NSU and other locations
- Bootcamps for summer interns
- Curriculum and course development and deployment
- Faculty workshops and sabbaticals

## ❖ CSET/Computer Science

- Cybersecurity Summer Academy
- Health Sciences Summer Academy
- CSET Undergraduate Summer Research Programs
- Cybersecurity Clubs and Events in local schools

# Cyber Security Facilities and Equipment

- ❖ **Cisco Networking Academy**
- ❖ **NETLAB+ Virtual Lab System**
  - 40+ cybersecurity and IT courses available (including custom designed)
  - Used by NSU and Consortium partners
- ❖ **Digital Forensics Lab**
- ❖ **Cybersecurity Training Lab**
- ❖ **Information Security Lab**
  - Cloud computing and big data systems with approximately
    - 700 Xeon 64-bit server cores
    - 4.3 TB RAM
    - 380 TB hard disk storage
    - 10 Gbps Ethernet connectivity and 40 Gbps Uplinks
  - Machine learning and data analytic workstations
- ❖ **McDemmond Applied Research Center (MCAR)**
  - Primarily for use by sponsored research programs

# Cyber Security Partnerships

- ❖ **Test Resource Management Center**
  - STEM Initiatives
  - National Cyber Range (NCR)
  - Cyber Test Technology (CTT)
- ❖ **Naval Network Warfare Command (U.S. Fleet Cyber Command)**
  - Working towards a **CRADA** to enhance situational awareness & decision support for Naval NOC
- ❖ **DoE K-20 Cybersecurity Workforce Consortium**
- ❖ **Sandia National Labs**
  - Research, co-advising student research, curriculum and course development, internships, workforce development, and recruitment
  - Technology transfer and training from SNL to Consortium partners
- ❖ **DeterLab (NSF/DHS)**
- ❖ **Cyber Virginia Initiatives**
  - New **Virginia Cyber Range**
  - New cybersecurity curriculum for Career & Technical Education (DoEd)
- ❖ **School Districts in Hampton Roads Region**

# Cyber Security Collaboration Opportunities

## ❖ Outreach & Workforce Development

- Summer internship @ DoD facilities
- Summer internship @ NSU (as boot camps for future interns @ DoD facilities)
- Developing and deploying new modules for Cyber T&E
- Recruitment

## ❖ Education

- Developing and deploying new curricula/courses for Cyber T&E
- A track for new Ph.D. in Computer Science program (under development)?

## ❖ Research and Development

- Co-advising student research
- Technology and knowledge sharing and leveraging
- Support UG/G research experiences through scholarships or assistantships
- **CRADA** or Cooperative Agreements for jointly selected research topics?
- S&T CTT Development

## ❖ Goal: full engagement year round and long term

# Acknowledgements

- ❖ Department of Defense
- ❖ Test Resource Management Center
  - STEM Initiatives
  - NCR
  - S&T CTT
- ❖ Air Force Research Lab/Rome
- ❖ Center of Excellence in Cyber Security
- ❖ Department of Energy/NNSA
- ❖ Consortium for K-20 Cybersecurity Workforce Pipeline
- ❖ Sandia National Labs
- ❖ Norfolk State University
- ❖ Department of Computer Science @ NSU
- ❖ IA-REDI @ NSU



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