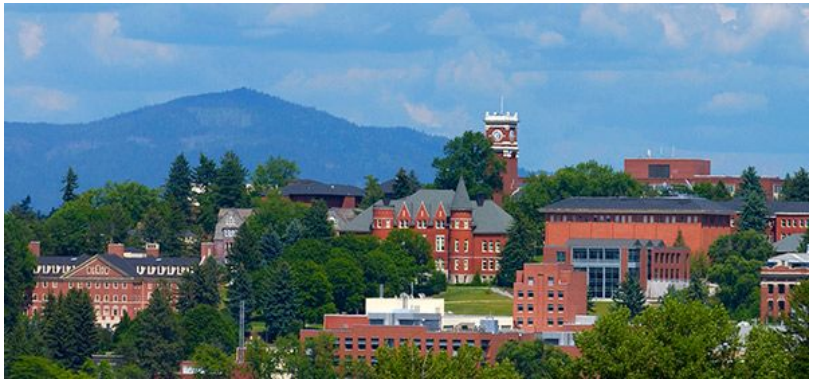
WASHINGTON STATE UNIVERSITY
School of
Electrical Engineering and Computer Science
VOILAND COLLEGE OF ENGINEERING AND ARCHITECTURE



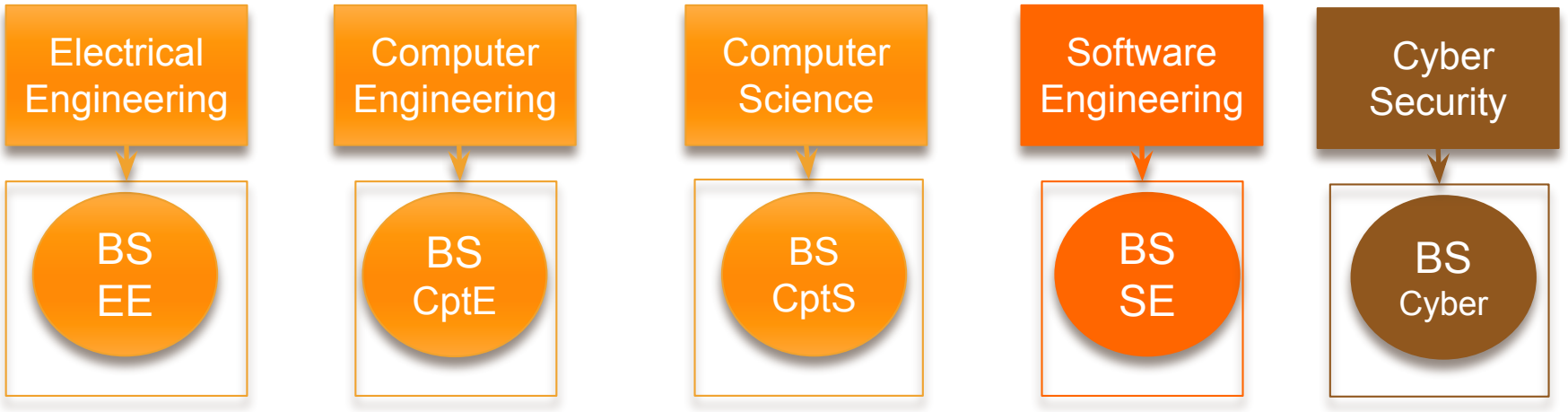
Cybersecurity @ WSU

Assefaw Gebremedhin

VICEROY CySER Summer Workshop 2025

assefaw.gebremedhin@wsu.edu

Programs @ WSU EECS



EE, CptE, CptS

Software Engineering

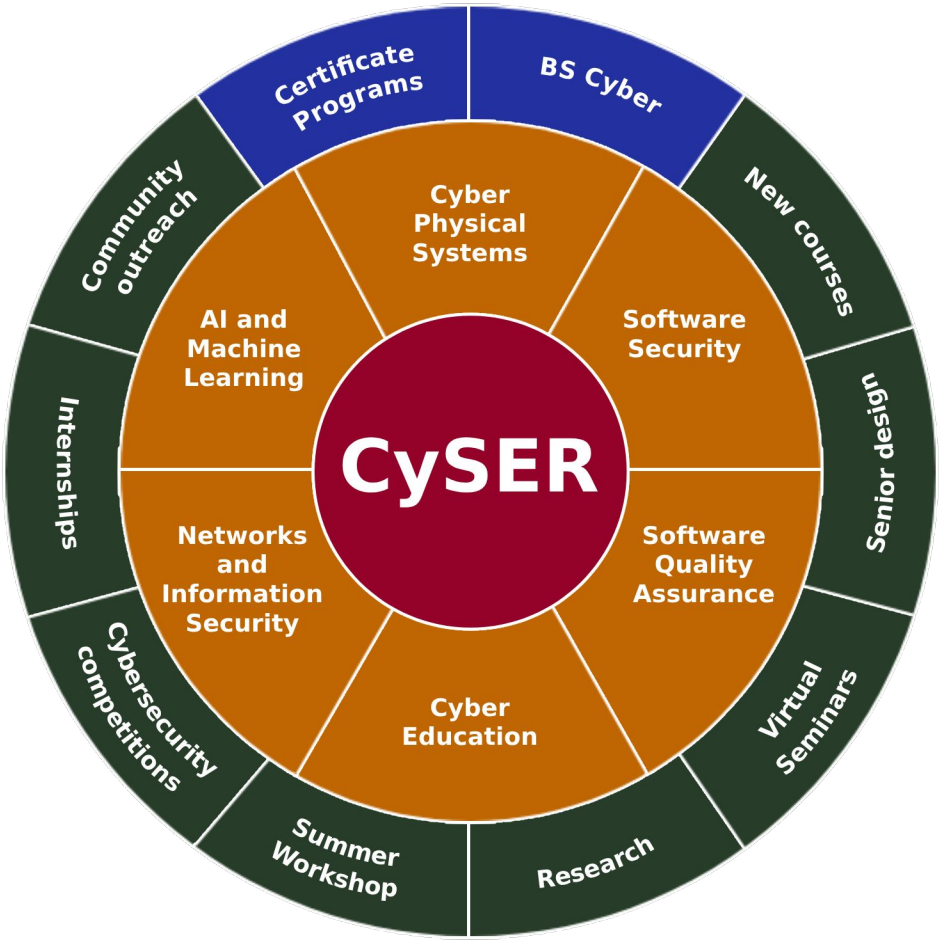
Cybersecurity

https://school.eecs.wsu.edu/academics/undergraduate-program

VICEROY Institute for Cybersecurity Education and Research (CySER)

- Established in June 2021 and funded by the Department of Defense through the **VICEROY program**
  - VICEROY = Virtual Institutes for Cyber and Electromagnetic Spectrum Research and Employ
  - VICEROY Institutes are managed by the Griffiss Institute
- Mission
  - Trains DoD-aligned civilian workforce and ROTC in cybersecurity
  - Integrates cybersecurity research and education with professional skills in teamwork, leadership and lifelong learning
- Builds a strong consortium in the Pacific Northwest for cybersecurity education and research
  - 4 institutions with complementary strengths and diversity
  - WSU (lead), Univ of Idaho, Montana State Univ, and Central Washington Univ
- Seeks to position WSU to attain Center of Academic Excellence in Cybersecurity designation

CySER Overview & Program Elements



CySER Program Formalization (Certificates at WSU)

CySER CAE-CO FUNDAMENTALS	CySER BASICS
1 *Coursework:* three required cyber security courses (9 cr.), four elective advanced computer science/cybersecurity courses (12 cr.)	1 *Coursework:* three required courses (9 cr.) in introductory programming, data management, and IT infrastructure and security
2 Cybersecurity capstone project	2 Cybersecurity capstone project
3 Cybersecurity internship	3 Cybersecurity internship
4 Mentored research project	4 Mentored research project
5 Bi-weekly seminars	5 Bi-weekly seminars
6 Summer workshop	6 Summer workshop

Reports, Publications, and Student Posters

Evaluation Reports

Year 3 | Year 2

CySER Publications

TITLE	AUTHORS	DATE	PDF	VENUE
A Critical Review of Cybersecurity Education in the United States	James Crabb, Christopher Hundhausen, Assefaw Gebremedhin	March 2024	PDF	ACM SIGCSE 2024
Cybersecurity Education and Research: Experiences in Training the Next Generation of Cyber Professionals	James Crabb, Assefaw Gebremedhin	May 2024	PDF	CYBER: The Magazine of the MCPA
Generative Machine Learning for Cyber Security	James Halvorsen, Assefaw Gebremedhin	May 2024	PDF	Military Cyber Affairs
Surmounting Challenges in Aggregating Results from Static Analysis Tools	Ann Marie Reinhold, Brittany Boles, A Redempta Manzi Muneza, Thomas McElroy, Clemente Izurieta	May 2024	PDF	Military Cyber Affairs
Using Digital Twins To Protect Biomanufacturing from Cyberattacks	Brenden Fraser-Hevlin, Alec Schuler, Arda Gozen, Bernard Van Wie	May 2024	PDF	Military Cyber Affairs

Edit

Student Posters

Summer Workshop 2024

- A Model System for Study of Cyberattacks on Biomanufacturing.

Dissemination

Student Clubs

Cyber competition participation

- Cyber Force (Nov 4-5, 2022)
- NICCD (Nov 11-12, 2022)
- Spokane Mayor's Cup (Feb 11, 2023) – **won first place** (picture)
- National Cyber League (2023, 2024, 2025) – **ranked 27th among 400+ schools in the Spring 2025 session**
- VICEROY's Dr. Boom Competition (Oct 2023) – **two WSU teams participated and won 2nd place and 6th place** out of more than 20 teams in the competition
- VICEROY Spectral Cloak 2024 – **a WSU team won first place**

Student Success: Examples

- VICEROY MAVEN 2023--2025
- VICEROY ENVOY 2023--2025
- VICEROY Symposium 2024, 2025
- ACE Program 2024
- 2024 VICEROY Dr. Boom Competition
- 2025 VICEROY Spectral Cloak Competition
- National Cyber League Competition (2023, 2024, 2025)
- Spokane Mayor’s Cup (2023, 2024)

New BS in Cybersecurity Program

- Independent degree program (major)
- Focuses on cyber operations
- Emphasizes hands-on coursework, experiential learning
- Credits Required: 120 (4-year)
  - 74 Comp Sci/Cyber; 16 Math/Stat; 30 General
- First two years very similar to BS in Comp Sci; last two years heavy on cyber courses

BS in Cybersecurity: design considerations

ABET requirements

NSA Center of Academic Excellence (CAE) in Cyber Operations (CO) requirements

General BS degree requirements

Need to finish in 4 years

Industry feedback

Example: Amazon, Boeing, F5 Inc.

Cybersecurity Courses

Required

- CptS 327: Fundamentals of Cybersecurity and Cryptography
- CptS 427: Cybersecurity of Wireless and Distributed Systems
- CptS 428: Software Security and Software Reverse Engineering
- CptS 455: Introduction to Computer Networks and Security
- CptS 439: Cybersecurity of Critical Infrastructure Systems
- CptS 426: Hardware Security and Hardware Reverse Engineering
- CptS 432: Cybersecurity Capstone Project

Electives

- CptS 424: Cyber Law, Ethics, Rights, and Policies
- CptS 425: Cyber Forensics and Anti-Forensics
- CptS 429: Virtualization and Offensive Cyber Operations
- CptS 431: Security Analytics and DevSecOps

Other courses in the BSCYBER degree

Computer Science	Math/Stat/General
CPTS 121: Program Design and Development	MATH 171: Calculus I
CPTS 122: Data Structures	MATH 216: Discrete Structures
CPTS 223: Advanced Data Structures	MATH 220: Linear Algebra
CPTS 260: Introduction to Computer Architecture	STAT 360: Probability and Statistics
CPTS 317: Automata and Formal Languages	ENGLISH 101: College Composition
CPTS 322: Software Engineering Principles I	ENGLISH 402: Technical and Professional Writing
CPTS 321: Object-Oriented Software Principles *or*	HISTORY 105: The Roots of Contemporary Issues
CPTS 355: Programming Language Design	MATH 301: Mathematical Reasoning *or*
CPTS 302: Professional Skills in Comput. & Eng.	PHIL 201: Formal Logic
CPTS 350: Design and Analysis of Algorithms	Social Science
CPTS 360: Systems Programming	Humanities
CPTS 451: Introduction to Database Systems *or*	Arts
CPTS 415: Big Data	Diversity
CPTS Elective (18 credits)	Lab Science Requirements (6 credits)

Key Cybersecurity Research Areas at WSU

AI for security and security of AI
Software engineering and security
Security of cyber-physical systems and critical infrastructure
Cryptography and post-quantum computing security
Hardware security
Web security and privacy
Cyber education

CyberCorps®
Defending America's Cyberspace

SCHOLARSHIP FOR SERVICE
WASHINGTON STATE UNIVERSITY

BENEFITS

- Up to 3 years of scholarship support
- Tuition paid by CyberCorps
- Additional stipend each year:
  - $27,000 for undergraduates
  - $37,000 for graduate students
- $6000/year professional allowance
- SFS-specific job fairs

ELIGIBILITY

- US citizen or permanent resident
- Full-time student at WSU
- 3.0 GPA or above
- Enrolled in one of these programs:
  - **BS in Cybersecurity**
  - **BS in Computer Science, Computer Engineering,** or **Software Engineering** with specific cybersecurity courses
  - **MS in Computer Science, Software Engineering,** or **Electrical Engineering** with cyber research and courses
  - **PhD in Computer Science, Software Engineering,** or **Electrical Engineering** with cyber research and courses
- Commit to working for a federal, state, local, or tribal government agency after graduation

COMMITMENT

Before graduating

- Maintain full-time enrollment
- Maintain good academic standing
- Respond to requests for information from SFS Program Office
- Complete a government internship
- Participate in WSU SFS experiential learning opportunities
- Begin searching for employment to meet post-graduation service commitment

After graduating

- Work full-time at an approved organization for a period commensurate with the length of the scholarship
- Maintain contact information and documentation regarding employment
- Respond to communications from SFS Program Office and WSU

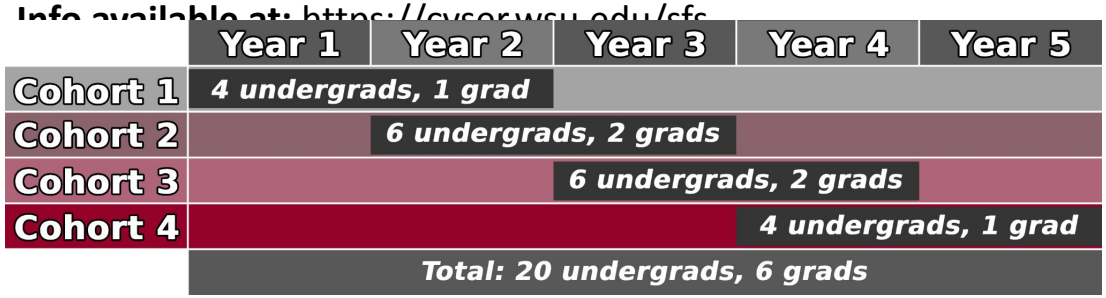
RESEARCH AREAS

- AI and Security
- Cyber-physical systems security
- Cryptography and post-quantum security
- Software supply chain security
- Hardware security
- Web security

cyser.wsu.edu/sfs/

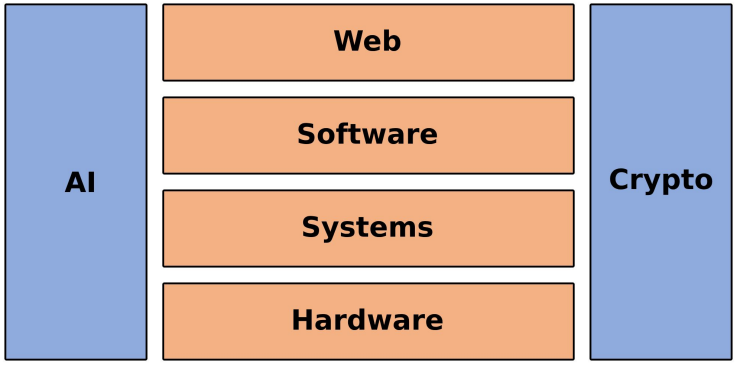
WSU SFS Program (Started in Jan 2025)

- Aims to recruit and train **20 undergraduate and 6 graduate students** over the course of five-years
- Provide excellent academic experience to SFS scholars through *integrated research*, *career mentoring*, *experiential learning*, and *internship* opportunities
- First cohort will begin in **Fall 2025**
- **Info available at:** https://cyber.wsu.edu/sfs



WSU SFS Program Research Areas and Team

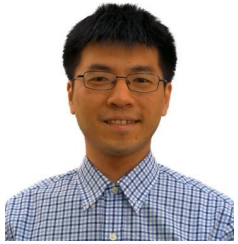
1. Artificial intelligence and Security
2. Cyber-physical Systems Security
3. Cryptography and Post-Quantum Security
4. Software Supply Chain Security
5. Hardware Security
6. Web Security



Assefaw Gebremedhin
(PI)

Jana Doppa
(Co-PI)

Monowar Hasan
(Co-PI)


Feng-Hao Liu
(Co-PI)

	MAY 19	MAY 20	MAY 21	MAY 22	MAY 23
9 AM – 12 PM	Introductions and Cybersecurity at WSU DOD speaker: Keynote address Cybersecurity education in the US	**Hands-on Demo** Cyber-physical systems security Daggy Hall 232	Web security and privacy **Hands-on Demo** Digital forensics	**Field Trip** Schweitzer Engineering Labs Pullman	**Field Trip** Schweitzer Engineering Labs Moscow
	LUNCH BREAK				
1 PM – 4 PM	DOD speaker: NUWC Keyport Protecting against digital repression Poster session and Certificate ceremony Bryan Hall 404	Towards usable and practical image privacy AI and cyber ethics Verification using software contracts	**PNNL Day** Data science-based vulnerability management LLM security evaluation GraphRAG and security applications	Quantum computing Post-quantum crypto Security of time-series machine learning Getting the most from your internships	**Industry Panel** Life-long learning and professional development

For up-to-date details see
https://cyser.wsu.edu/summer-workshop/

A. Gebremedhin
EECS, WSU
Organizer

VICEROY CySER Summer Workshop 2025

May 19 – May 23
Pullman, WA

Speakers & Panelists

James Crabb
EECS, WSU
Organizer

M

Partha Pande
VCEA, WSU

A. Kalyanaraman
EECS, WSU

CJ Maciag
OUSD (R&E)

Aaron Darnton
NUWC Keyport

J. Henrichsen
Murrow, WSU

T

M. Hasan
EECS, WSU

Rakesh Bobba
EECS, OSU

Sherri Conklin
PPPA, WSU

Tom Gilray
EECS, WSU

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W

Xu Lin
EECS, WSU

Yvette Hastings
SECL, MSU

Joseph Aguayo
PNNL

M. Halappanavar
PNNL

David Stone
PNNL

TH

M. Ismail
CEROC, TTU

Feng-Hao Liu
EECS, WSU

Jana Doppa
EECS, WSU

Sandi Brabb
VCEA, WSU

Sola Adesope
CESHS, WSU
(speaking **Friday**)

F

Sonja Glumich
AFRL

Jess Smith
PNNL

David Stone
Google

Nathan Kipp
SEL

Dan Brown
CISA