T3-CIDERS: Fostering a Community of Practice in CI- and Data-Enabled Cybersecurity Research Through A Train-the-Trainer Program

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Abstract

We present T3-CIDERS, the "Train-The-Trainer approach to fostering cyberinfrastructure (CI)- and Data-Enabled Research in CyberSecurity." T3-CIDERS participants, termed "future trainers" (FTs), are trained in effective instructional design and CI hands-on materials from the previous CyberTraining program, "DeapSECURE." The program aims to enhance cybersecurity research and education through advanced CI techniques such as artificial intelligence, big data, parallel programming, and platforms like high-performance computing (HPC) and cloud systems. T3-CIDERS includes pre-training, a weeklong summer institute, ongoing learning engagements, and local training activities by FTs at their institutions. Community building is integral to T3-CIDERS as its overarching goal. The first cohort of FTs represents multiple states. In 2025, a fully online program will expand its reach to a broader audience.

What Is … T3-CIDERS acronym

ˈtē-ˈthrē ˈsī-dər   1: A shorthand for "A Train-The-Trainer Approach to Fostering CI– and Data-Enabled Research in CyberSecurity"

A train-the-trainer program for advanced cyberinfrastructure (CI) skills

- Designed to be synergistic with research, teaching, and learning activities in cybersecurity and cyber-related disciplines.
- Focused on teaching HPC, big data, machine learning, cryptography, parallel programming

Goals & Target Audience

Goal: Accelerate state-of-the-art research & development in cybersecurity and related fields by:

- Preparing competent trainers to broaden utilization of advanced CI;
- Fostering a community of practice for CI-enabled cybersecurity research.

Target Audience: Faculty, researchers, students, practitioners with research interest in cybersecurity and cyber-related fields — Collectively called "*Future Trainers*" (FTs)

Program Overview

Training & Engagement:

- **Pre-training** (1 month) — Self-paced, virtual training on CI skills baseline (HPC, Unix shell, Big Data [Pandas])
- **Summer Institute** (1 week) — In-person training on CI technical contents and pedagogy/training methodology
- **Monthly Learning Engagement** (1 year) — Virtual meetings on further CI learning, teaching/research experience sharing

Outcomes & Sustained Activities:

- **Local Training** (required) — FT units conduct local training activities tailored to their own academic communities
- **K-12 Outreach** (optional) — FT units spread awareness of cybersecurity, research, and the role of CI to support cyber research to local K-12 schools
- **"Module X"** — A community-driven, new CI training module to be jointly designed & developed by FTs and the project team to address pressing training needs of the new generation of cyber researchers
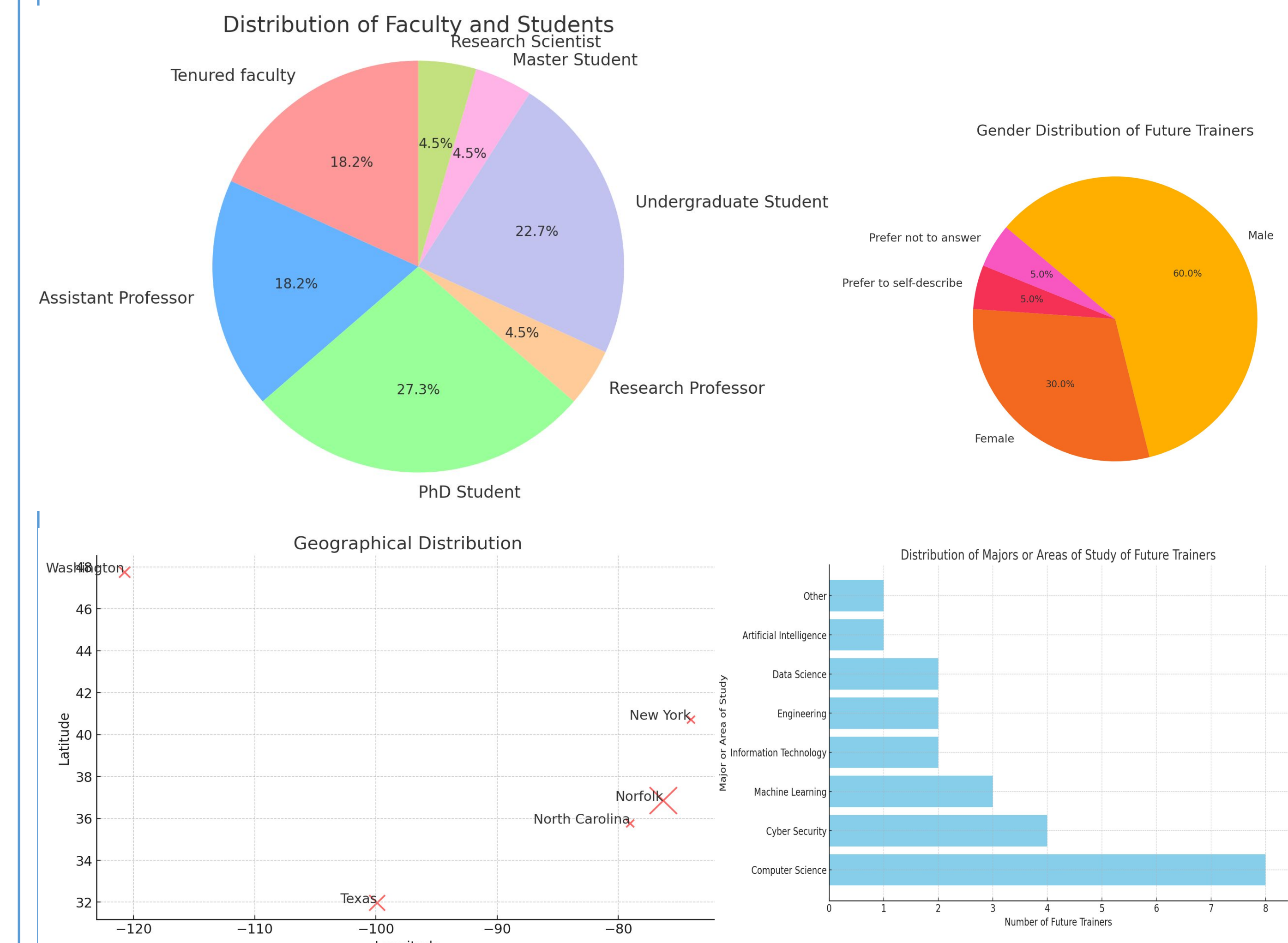
Training Contents

Contents delivered through pre-training and summer institute:

- **Technical lesson modules**: Six hands-on CI modules from the "DeapSECURE" CyberTraining program (NSF grant #1829771)
- **Pedagogical training**:
  - Educational foundations (including assessments)
  - Lesson planning (hands-on)
  - Simulated teaching practice
- **Discussion panels** on research & practice convergence (cybersecurity experts and K-12 educators)

Teaching Preparation

- **"FT unit"** := a pair of one faculty/senior researcher and 1–2 student(s).
- Total 9 FT units in 2024 cohort
- Each FT unit created its own teaching proposal and lesson plan
  - Varied formats: New coursework; update to existing coursework; hands-on workshop
  - Faculty & student may co-teach!

2024 Cohort Overview

Distribution of Faculty and Students

Gender Distribution of Future Trainers

Geographical Distribution

Distribution of Majors or Areas of Study of Future Trainers

10 faculty/researchers; 12 students; very diverse backgrounds

Sample Responses from Summer Institute

"Learned some new concepts with the hands-on experience."

"I feel really well equipped to teach."

"This summer institute for me was like a roller coaster. One day I [was] so lost about the topic of the day, and the next I would follow along just fine. However, I felt this was good exposure to important topics within cybersecurity even with the little knowledge base I am working with."

More to come … 2024 cohort still continues on thru Summer 2025!

Resources & Acknowledgments

Project Website
https://sites.wp.odu.edu/t3-ciders/

Keep in touch with us!
T3-CIDERS Interest List

https://odu.co1.qualtrics.com/jfe/form/SV_3ZPARAHm2wK1D9Q