



CENTER FOR TRUSTWORTHY
SCIENTIFIC CYBERINFRASTRUCTURE
The NSF Cybersecurity Center of Excellence

The Report of the
California State Polytechnic University Pomona SFS Engagement
November 28, 2017

Acknowledgements

The organizers wish to thank all students who attended the workshop, the instructors, Nathan Hom who took video and photos for the event, and the staff who helped everything run smoothly. Special thanks goes out to Victor P. Piotrowski who approved funding the student's travel and to the National Science Foundation for making this event possible and to the cyberinfrastructure professionals panel: Karl Mattson, Veronica Mitchel, John W. McGuthry, and Jim Basney.

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About this Report

This report was drafted after the conclusion of the workshop and was circulated among the CTSC and CPP instructors.

Citing this Report

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<https://trustedci.org/cpp-sfs-final-report>.

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Executive Summary

On the weekend of October 14th, the California State Polytechnic University Pomona Scholarship for Service program in collaboration with the Center for Trustworthy Scientific Cyberinfrastructure (CTSC)¹ hosted a cyber workshop for Scholarship for Service (SFS) students. 45 Students from 13 different universities traveled to Pomona, CA, to participate despite looming midterms the following week. Students spent all day Saturday and half of Sunday participating in workshops covering topics such as public key infrastructure and deployment, log analysis + Splunk, network security in a Science DMZ, and federated identity and access management.

The students at this workshop are participants of the Cybercorps Scholarship for Service (SFS) program, designed by the National Science Foundation to strengthen the workforce of information assurance professionals protecting the government's critical information infrastructure.² The SFS program provides a scholarship to full-time students that typically includes full tuition, related fees, and a stipend. These students then repay the program through public service and employment in a government agency. Agencies and positions qualifiable for the program include both federal and state institutions.

The engagement process started in May of 2017, with CPP submitting an application to CTSC requesting assistance in creating a training workshop for the SFS students. Once the engagement started, CPP and CTSC equally shared the task of planning the event.³ Cal Poly Professors Dr. Mohammad Husain, Dr. Ron Pike, and Dr. Tingting Chen, as well as CTSC security professionals Dr. Jim Basney, Jeannette Dopheide, John Zage, and Kay Avila participated in the coordination. Materials from previous CTSC lectures and training were used as a base for the lessons taught by CTSC, as well as creation of new material. Hands-on training was prepared in a single virtual machine from the NSF project SEED base image.

¹See also, <https://trustedci.org/>

²See also, <https://www.sfs.opm.gov/>

³See also, <http://blog.trustedci.org/2017/07/cal-poly-pomona-scholarship-for-service.html>

At the end of the day on Saturday, the students were introduced to a panel of professionals to showcase different career paths for the security profession. The panel consisted of Karl Mattson, the Chief Information Security Officer for City National Bank; Veronica Mitchel, a cyber risk officer for the city of Long Beach, CA; Deronda Dubose, a special agent for the secret service; John W. McGuthry, the Chief Information Officer for Cal Poly Pomona; and Dr. Basney, a CTSC co-PI. Dr. Daniel Manson, a professor and the campus Information Security Officer at Cal Poly, moderated the conversation. Students did a phenomenal job participating in the panel, giving elevator speeches and promoting their extracurricular activities while receiving feedback on their participation from the panel.

1 Background

CyberCorps (R): Scholarship For Service (SFS) is a unique program designed to increase and strengthen the cadre of federal information assurance professionals that protect the government's critical information infrastructure. This program provides scholarships that may fully fund the typical costs incurred by full-time students while attending a participating institution, including tuition and education and related fees. Additionally, participants receive stipends of \$22,500 for undergraduate students and \$34,000 for graduate students. The scholarships are funded through grants awarded by the National Science Foundation.

Cal Poly Pomona has one of the nation's leading cyber security programs. They have been named a National Center for Academic Excellence in Information Security and Cyber Defense Education. Their approach to cyber education begins with getting children excited about cybersecurity before they even come to a college campus, mentoring more than 1000 Los Angeles Unified School District students. This comprehensive and outreach program they call the "K to Gray". For attending collegiate students, the university offers amazing assets for practice and learning cybersecurity. Students can join the SWIFT (Students with Interest in Future Technology) club that competes in Collegiate Cyber Defense Competitions, as well as the FAST (Forensics and Security Technology) club that practices forensics and hacking of integrated devices. The university also offers the Polysec Lab which is a center for education and research in information assurance, security, and forensics. They also host a student run data center where students can gain first hand experience running a cloud computing center. As part of their pursuit of educational excellence, they contacts CTSC for a workshop engagement.

2 Purpose

Prof. Mohammad Husain contacted CTSC to request an engagement to provide a hands-on experience in securing cyber infrastructure for the students in the CPP SFS program in the CPP PolySec Lab. There are 65 NSF SFS programs nationwide and this engagement provides a model to engage those programs supporting over 600 students (spread across 65 campuses nationwide) who are trained to be a government cyber employee. Introducing these students

to the unique cybersecurity challenges of NSF cyberinfrastructure (CI) will expand their knowledge and encourage them to consider joining the team of CI Professionals helping to solve these challenges in the future. The CTSC engagement team includes a graduate of Purdue's SFS program.

CTSC and Cal Poly Pomona worked together to conduct an on-site seminar at CPP for SFS students at CPP and other campuses that introduced the unique cybersecurity challenges of NSF cyberinfrastructure and provided practical training on cybersecurity topics in the areas of expertise of CTSC staff.

3 Organizing Members

CTSC personnel:

- Jim Basney, CTSC lead
- Jeannette Dopheide, Senior Education, Outlook and training Coordinator
- Kay Avila, Senior Security Engineer
- John Zage, Research Programmer

Engagees:

- Mohammad Husain, Cal Poly Pomona lead, PI of the SFS program
- Ron Pike, Faculty and Director of Student-run Data Center
- Tingting Chen, Faculty and co-PI SFS program

4 Timeline

- May 19th, 2017 - Kickoff meeting
- June/July - recurring meetings, draft seminar content, discuss campus CI
- August 15th - 17th, 2017 - Meet face to face at the NSF Cybersecurity Summit
- August/September - meetings, finalize seminar content
- September - blog post promoting training seminar
- September - 1hr seminar presentation for UIUC SFS students (trial run)

- October 12 - CTSC team travels to Cal Poly Pomona
- October 13 - Pre-event meetings
- October 14th-15th, 2017 - Training seminar at Cal Poly Pomona
- October 16 - CTSC departs Cal Poly Pomona
- November, 2017 - Wrap up engagement and report outcomes
 - Blog post

5 Participants

5.1 Instructors

Jim Basney is an identity management expert and the principal investigator of CILogon. CILogon bridges the identity credentials generated by the nation's universities, through the InCommon Federation, to certificates for authentication to NSF's CI projects. Dr. Basney also leads MyProxy, which provides credential management software used in many large grid projects including the LHC Computing Grid and XSEDE, and is a member of the International Grid Trust Federation

Jeannette Dopheide is an education outreach coordinator at the NCSA. Her experience in education and outreach began as a high school teacher before moving onto business systems analysis and applications training for a commercial software company. Jeannette joined CTSC and NCSA in 2014 and works primarily on education outreach for projects that impact both CTSC and NCSA. Jeannette is a graduate of Illinois State University.

Kay Avila is a Senior Security Engineer at the National Center for Supercomputing Applications. She joined CTSC and NCSA in 2017, following previous positions in network security at a Fortune 500 insurance company and in higher education. Formerly, as an undergraduate at the University of Northern Iowa, she was involved with supercomputing outreach through the SC Education Program and the LittleFe and Bootable Cluster CD (BCCD) projects.

John Zage is a Research Programmer at the National Center for Supercomputing Applications. He joined NCSA in 2017 following his participation in Cybercorp's Scholarship for Service (SFS) program in the Information security graduate curriculum at Purdue University. Prior to his participation in SFS, John obtained a Master of Science Degree in Computer Science from Purdue focusing on computer security. His previous work experience includes working as a security researcher with MITRE Corporation and with the US Army Research Lab, and as a security analyst for Ontario Systems, a company specializing in managing receivable accounts.

Mohammad Husain is currently an Associate Professor at California State Polytechnic University, Pomona (Cal Poly Pomona) where he joined as an Assistant Professor in the Fall of 2012. He graduated with a PhD in Computer Science and Engineering from the University at Buffalo, The State University of New York (2012). His PhD thesis was on developing a holistic approach to lightweight data security in embedded cloud computing domain. His broad research interest is in the field of Security & Forensics.

Ron Pike is an Associate professor and Director of Cyber Programs in the Computer Information Systems Department at Cal Poly Pomona. His work and research focuses on networking and network security. He also, currently teaches and conducts research in the data communications and information security fields.

Tingting Chen is currently an assistant professor in Computer Science Department, at California State Polytechnic University, Pomona. She graduated with a Ph.D. degree from Computer Science and Engineering Department, at State University of New York at Buffalo, in June 2011. She received her M.S. degree and B.S. degree both in Computer Science and Engineering from Harbin Institute of Technology, China, in 2006 and 2004 respectively. From August 2011 to June 2014 she worked as an assistant professor in Computer Science Department, Oklahoma State University.

5.2 Students

| School | Number Attending |
|--|------------------|
| California State University, Sacramento | 5 |
| California State Polytechnic University Pomona | 16 |
| Hampton University | 1 |
| Johns Hopkins University | 3 |
| Norfolk State University | 1 |
| Northeastern University | 2 |
| Polytechnic University of Puerto Rico | 1 |
| Tennessee Technological University | 5 |
| University of Idaho | 5 |
| University of Alabama in Huntsville | 1 |
| University of New Mexico | 1 |
| University of Texas at Austin | 1 |
| Worcester Polytechnic Institute | 3 |

6 Agenda

Friday afternoon (10/13)

| Hour | Title | Presenter(s) |
|---------|--|--------------------|
| 3:30 PM | Tour of CPP Student Data Center and Cyber Labs | Husain, Pike, Chen |

| | | |
|---------|---|--------|
| 5:00 PM | Developing Cybersecurity Programs and CI Programs | Basney |
| 6:00 PM | <i>DINNER</i> | |

Saturday (10/14)

| Hour | Title | Presenter(s) |
|----------|---|----------------------|
| 8:30 AM | <i>BREAKFAST</i> | |
| 9:00 AM | Intro to supercomputing & science projects, CI | Husain, Basney |
| 9:30 AM | Example CI projects 1: CTSC Projects | Zage, Avila, Basney |
| 10:00 AM | Crypto Overview | Husain, Chen |
| 10:20 AM | <i>BREAK</i> | |
| 10:40 AM | Example CI projects 2: Medical/Genomic Data privacy | Chen |
| 11:00 AM | Public Key Infrastructure and Deployment | Husain |
| 12:00 PM | <i>LUNCH</i> | |
| 1:00 PM | Security Policies | Basney, Pike |
| 1:30 PM | Log Analysis + Splunk | Avila |
| 3:00 PM | <i>BREAK</i> | |
| 3:20 PM | Network Security in a Science DMZ | Basney, Zage |
| 4:00 PM | CI Professional Career options | Basney, Husain, Pike |
| 6:00 PM | <i>DINNER</i> | |

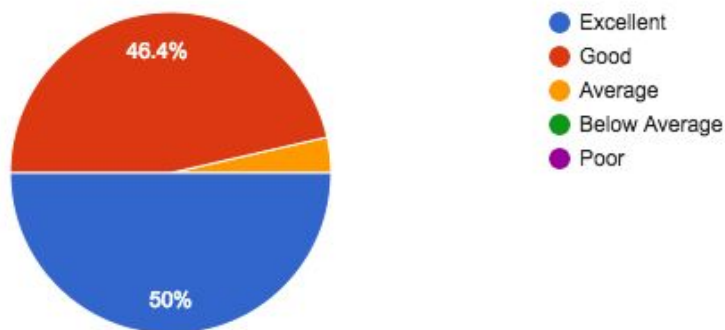
Sunday (10/15)

| Hour | Title | Presenter(s) |
|----------|---|--------------|
| 8:30 AM | <i>BREAKFAST</i> | |
| 9:00 AM | Federated Identity Management and Access Management | Basney |
| 10:00 AM | Example CI projects overview 3: SDC vending machine | Pike |
| 10:20 AM | <i>BREAK</i> | |
| 10:40 AM | Incident Response | Basney, Zage |
| 11:10 AM | SIEM training | Husain, Pike |

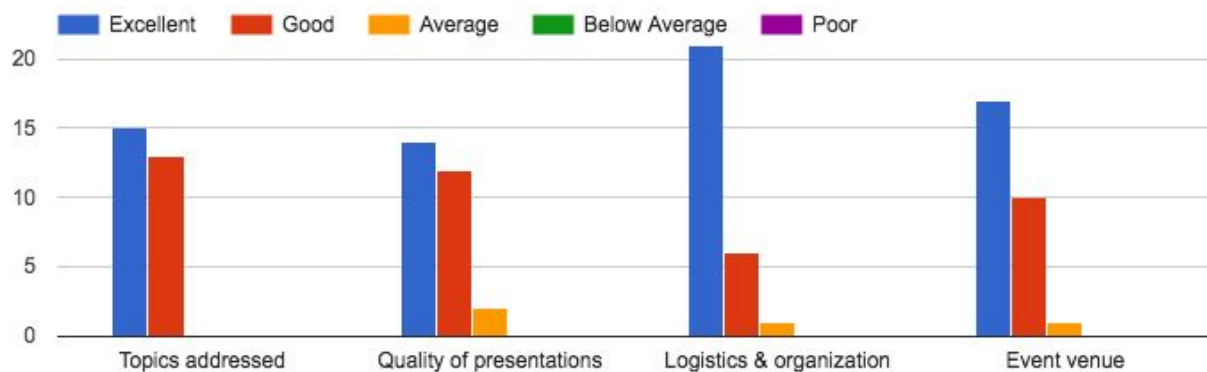
7 Attendee Evaluations

How would you rate your overall experience at the security training workshop?

28 responses

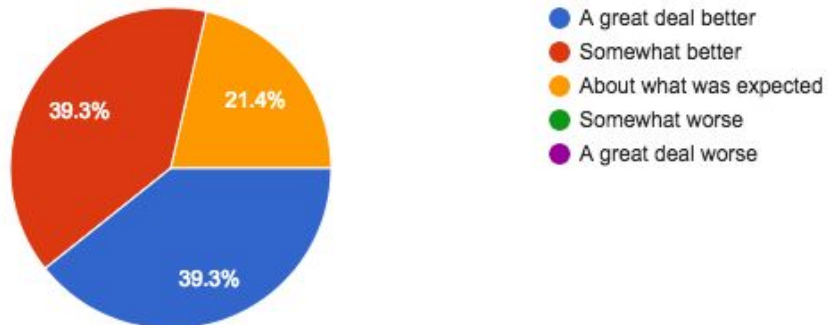


Please rate your experience with the training workshop in these areas:



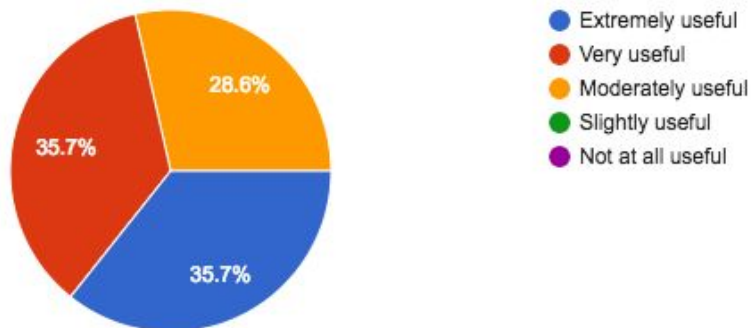
Was the training workshop better than what you expected, worse than you expected, or about what you expected?

28 responses



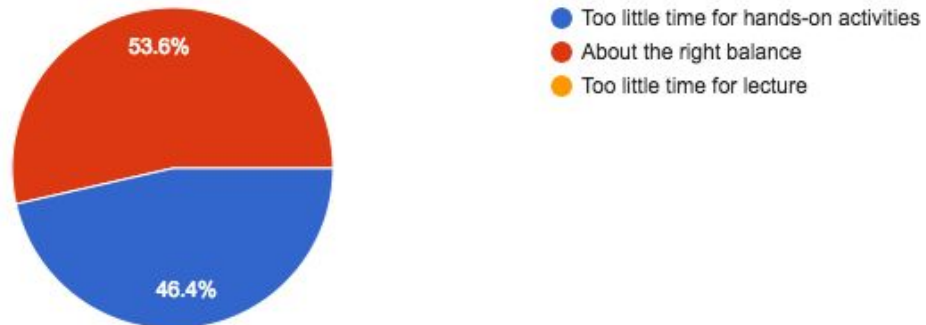
How useful to your academic coursework was the information discussed at the workshop?

28 responses



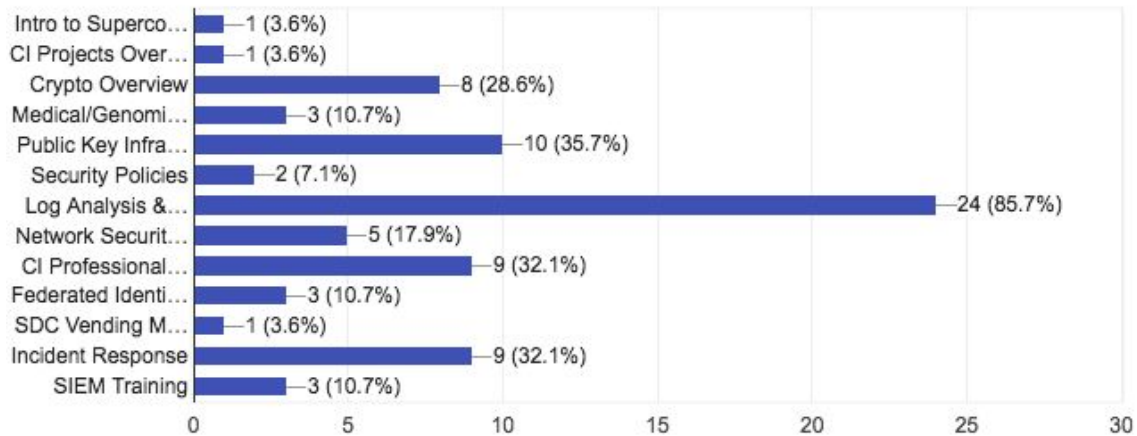
How would you describe the balance between lecture and hands-on activities?

28 responses



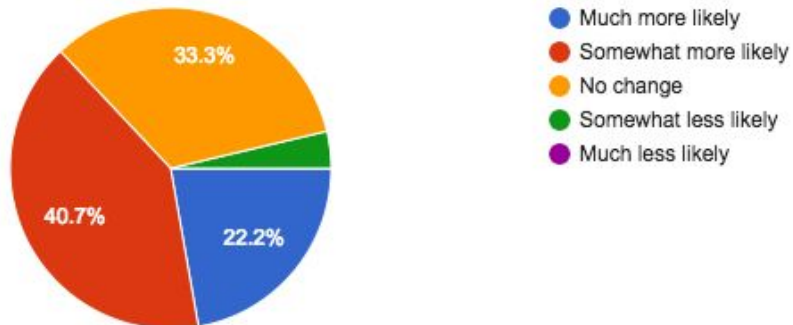
What presentations did you find the most valuable? (Choose up to 3)

28 responses



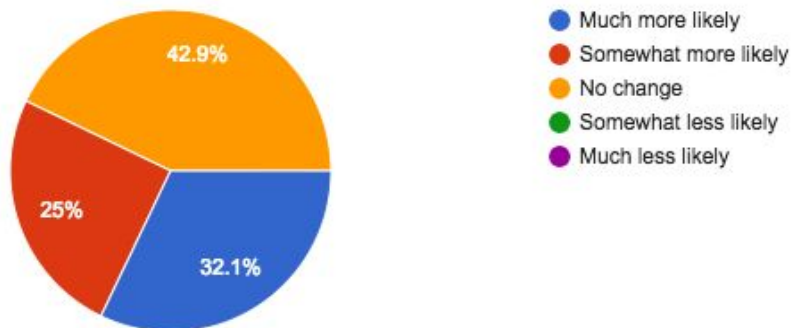
Has this workshop influenced you to pursue a career in cyberinfrastructure security?

27 responses



Has this workshop influenced you to pursue a career in the public sector?

28 responses



Survey responses indicate the hands-on sessions were well received, especially the log analysis session. Ninety-five percent of students found the workshop either good or excellent, while sixty-three percent thought they were more likely to pursue a career in cyberinfrastructure security after the workshop.

The written responses of the survey made it clear the workshop needed to improve on communicating the expectations and purpose of the workshop. Within the feedback was mentioned the presentations were too brief for folks to learn anything new. The purpose of

the workshop when designed was to give a hands-on experience and exposure of the broad array of topics within cyberinfrastructure security for students to get a feel of what work in the field would entail. This would hopefully help the student find a better fit for their interest in the field, which seemed to be the case according to the surveys.

8 Deliverables

As seen in the attendee evaluations, the workshop was perceived positively. The workshop not only provided a service to the SFS students, it also developed the following materials during the engagement:

- Workshop training curriculum

- Hands-on exercises

- Video of training sessions

The training materials are archived at <http://hdl.handle.net/2142/98520>.

The photos are archived at <http://go.ncsa.illinois.edu/cpp-ctsc-sfs-photos>.

9 Impact

The workshop helped encourage 63% of the participants to pursue cyberinfrastructure security, while encouraging 57% of those same students to pursue a career in the public sector. With the need for cybersecurity experts in the government to secure our nation's systems, any improvement in filling those positions is a step toward the right direction. In addition, once the training sessions are posted online, it might have a similar impact on online viewers.

10 Closing Thoughts

In closing, the SFS workshop with CPP was a very successful engagement. The majority of those students were positively impacted by the training sessions and left with more enthusiasm for cyberinfrastructure security. The collaboration between CPP and CTSC went very smoothly and produced a successful workshop. For future events, possible changes that could address the

desire for more in-depth information could include different tracks for in-depth looks at topics. These different tracks would have a short introduction to their topic so students without cyber experience could make an informed decision. In addition, it would be beneficial to use more agencies to develop real world examples that relate to the topics.