

TEACHING CYBERSECURITY AND PYTHON PROGRAMMING IN A 5-DAY SUMMER CAMP

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CCSC-NE 2018



GOALS

Recruitment

Early cybersecurity exposure

Self-funding

Learn some programming

BACKGROUND

First such camp at Stetson

High school juniors, seniors, entering college freshmen

Mon-Fri, 9am-3pm (25 hrs)

Students pay \$295 (\$595 with housing)

33 students attended

Teacher (me) gets summer salary; also hired TA

Pre/post assessment to measure learning

CURRICULAR GOALS

Python + Cybersecurity

Gradual progression, a “story”

HIGH-LEVEL CURRICULUM OVERVIEW

1. Topics overview + definitions
2. Machine-to-machine communication (sockets)
3. Machines far away (routing)
4. Hiding messages from middle machines (encryption)
5. Hiding source and/or destination of messages (proxies, onion routing)

MATERIALS

Google Cloud Platform (\$0.89/student for one week)

Debian Linux, and some packages

Students use lab computers + PuTTY

Website: <http://2017.csss.artifice.cc/>

DAY BY DAY CURRICULUM

Day 1	Day 2	Day 3	Day 4	Day 5
Morning	Morning	Morning	Morning	Morning
Pre-assessment, connect to VMs, simple Python				
Afternoon	Afternoon	Afternoon	Afternoon	Afternoon
Python guess-the-number, cybersecurity overview				
Homework	Homework	Homework	Homework	Homework
Find news story				

DAY BY DAY CURRICULUM

Day 1	Day 2	Day 3	Day 4	Day 5
Morning	Morning	Morning	Morning	Morning
Pre-assessment, connect to VMs, simple Python	Infinite guess-the- number; routing; TCP/IP; socket programming			
Afternoon	Afternoon	Afternoon	Afternoon	Afternoon
Python guess-the- number, cybersecurity overview	Python BBS; how DNS works, choose own domain names			
Homework	Homework	Homework	Homework	Homework
Find news story	BBS for domains			

DAY BY DAY CURRICULUM

Day 1	Day 2	Day 3	Day 4	Day 5
Morning	Morning	Morning	Morning	Morning
Pre-assessment, connect to VMs, simple Python	Infinite guess-the-number; routing; TCP/IP; socket programming	Create mini-DNS; define our protocol; update BBS to use it		
Afternoon	Afternoon	Afternoon	Afternoon	Afternoon
Python guess-the-number, cybersecurity overview	Python BBS; how DNS works, choose own domain names	Hashing & encryption; password cracking		
Homework	Homework	Homework	Homework	Homework
Find news story	BBS for domains	Add reverse-DNS		

DAY BY DAY CURRICULUM

Day 1	Day 2	Day 3	Day 4	Day 5
Morning	Morning	Morning	Morning	Morning
Pre-assessment, connect to VMs, simple Python	Infinite guess-the-number; routing; TCP/IP; socket programming	Create mini-DNS; define our protocol; update BBS to use it	Create reverse-DNS; Python password manager	
Afternoon	Afternoon	Afternoon	Afternoon	Afternoon
Python guess-the-number, cybersecurity overview	Python BBS; how DNS works, choose own domain names	Hashing & encryption; password cracking	PGP keys, how SSL works; tour IT server room	
Homework	Homework	Homework	Homework	Homework
Find news story	BBS for domains	Add reverse-DNS		

DAY BY DAY CURRICULUM

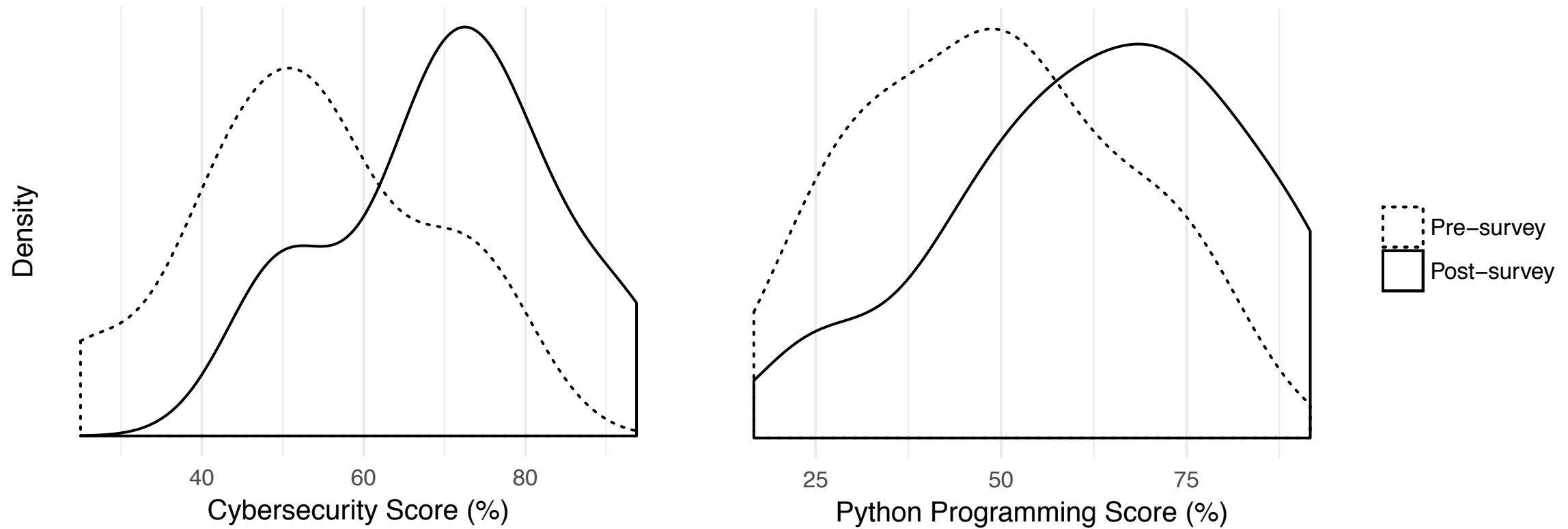
Day 1	Day 2	Day 3	Day 4	Day 5
Morning	Morning	Morning	Morning	Morning
Pre-assessment, connect to VMs, simple Python	Infinite guess-the-number; routing; TCP/IP; socket programming	Create mini-DNS; define our protocol; update BBS to use it	Create reverse-DNS; Python password manager	Role of proxies; Tor for BBS client; onion routing; Tor for BBS server (“dark web”)
Afternoon	Afternoon	Afternoon	Afternoon	Afternoon
Python guess-the-number, cybersecurity overview	Python BBS; how DNS works, choose own domain names	Hashing & encryption; password cracking	PGP keys, how SSL works; tour IT server room	Post-assessment, review material (after assessment), guest lectures
Homework	Homework	Homework	Homework	Homework
Find news story	BBS for domains	Add reverse-DNS		

EVALUATION

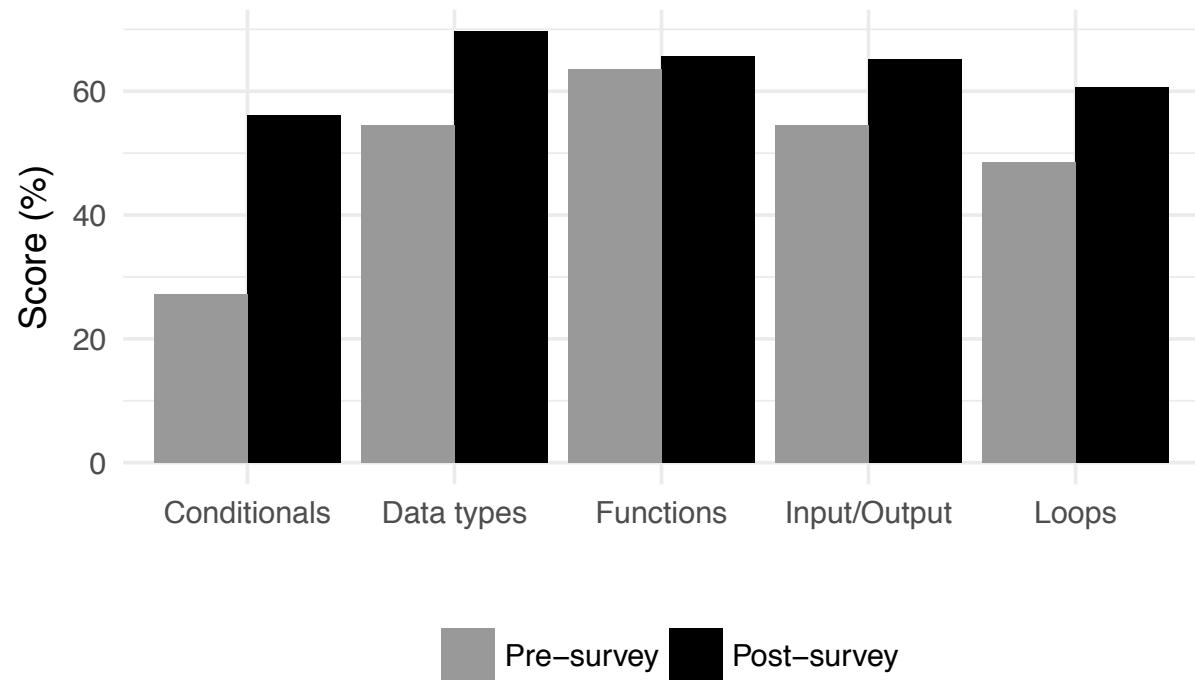
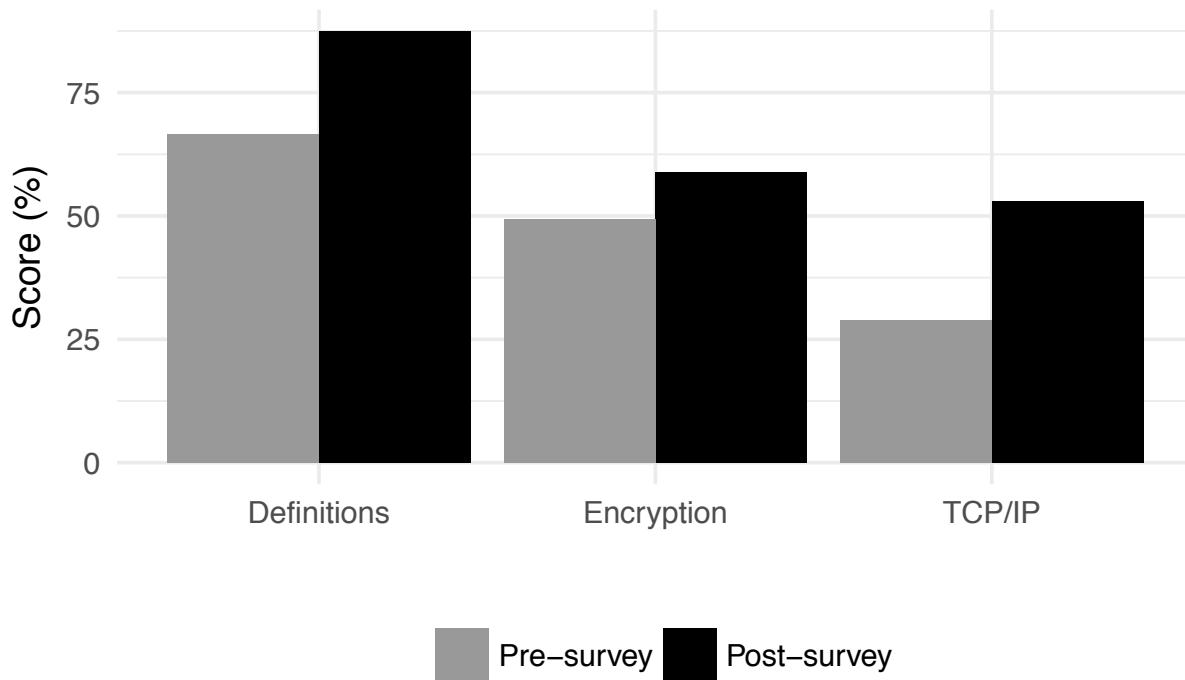
Prior Experience	Python Score	
	Mean	Std dev.
None	44%	11%
Some	40%	18%
Lots	68%	11%

Scores	Python Mean	Python Std dev.	Cyber. Mean	Cyber. Std dev.
Pre-survey	49%	18%	53%	15%
Post-survey	63%*	19%	70%*	14%

EVALUATION



EVALUATION



PLANS FOR THIS YEAR AND BEYOND

Hide socket coding details

Drop PGP practice, focus more on password manager

Give candy for homework?

Industry guest-speaker

Field trips?

QUESTIONS?