



Hello ~~Hackers~~ Wildcats

Level 0x00: pwn.college



Quick Overview

- About me
- Club Agenda
- CTF
- Pwn.college

About me - Mike Wales

- Working at Research Innovations
- Work at Nightwing CODEX for 10 years
- Worked at L3Harris for 14 years
- BS Computer Engineering - UCF 2001
- Software Development
 - Mostly embedded (VxWorks, Linux)
 - Mostly C/C++
- Cybersecurity Engineer
 - Hacking
 - Reverse Engineering
 - Vulnerability Research
 - Software Developer
- 5th year of helping with CS Club
- Retro-gaming



NIGHTWING



What does a career Cyber Security pro do?

CERTIFICATIONS

Azure
CASP+
CCNA
CEH
CISA
CISM
CISSP
CRISC
Cryptography
CTIA
CND
Forensics
Malware Analyst
OSCP
Pen Testing
Security+

CAREERS

Security Engineer
Chief Information Security Officer
Security Analyst
Computer Forensics
Security Consultant
Digital Forensics
Cryptographer
Security Administrator
Penetration Tester
Security Software Developer
Security Specialist
Security Code Auditor
Security Architect
Malware Analyst
Data Protection Officer
Cybercrime Investigator
Cryptanalyst
Security Incident Responder
Chief Privacy Officer
Risk Manager
Network Administrator
Business InfoSec Officer
Information Security Manager
Cyber Operations Specialist

- Per cybersecurityguide.org
- There are so many careers and positions in this field
 - Many of these are awful 🙄



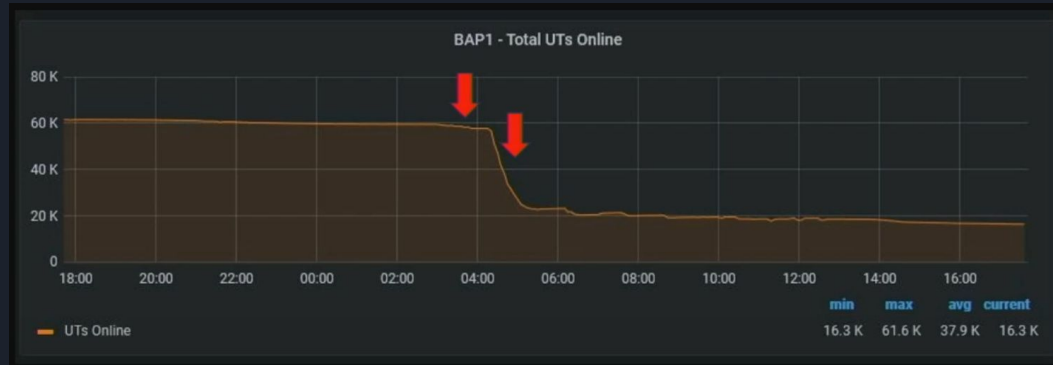
Offensive Cyber Security

- Positions / Job Titles
 - CNO Developer
 - Vulnerability Researcher
 - Reverse Engineer
- Skills
 - C, C++, Python
 - OS Internals
 - Linux, Embedded, Windows, Mobile (Android, iOS)
 - Networking, RF, routing
 - Assembly (x86, x64, ARM, PPC, MIPS, SPARC, 68k, or others)
 - RE and Debugging Tools: GDB, IDA, Ghidra, Binary Ninja



Why are these skills important?

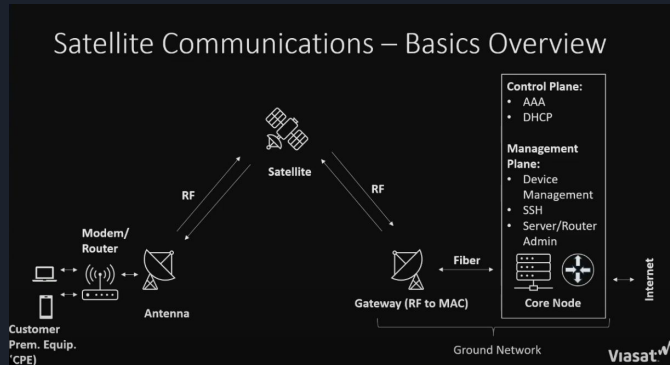
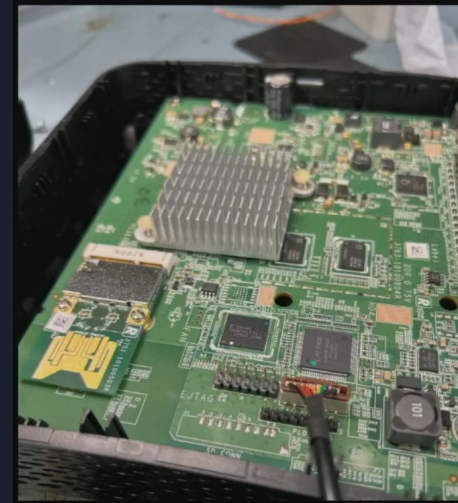
- Viasat (satellite communication) online terminals on Feb 24, 2022



- Who are the users of satellite communication terminals?

Everything bricked...

- Firmware wiped off devices
- What happened?
- How did they get in?
- How can we prevent in the future?
- How can we fix all these?



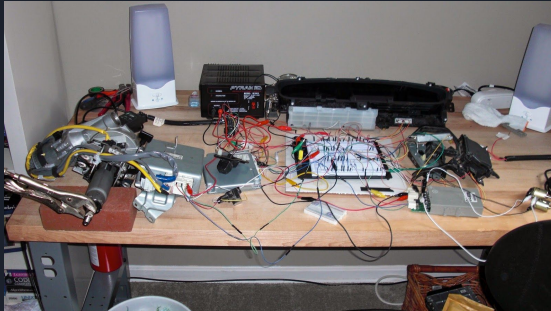


Why learn offensive security

- Learning programming and scripting
- Learning how operating systems work and access controls
- Learn new software introspection techniques (debugging, tracing, emulation)
- Learn how code gets converted to executable code
 - How are symbols found?
 - How do function calls work?
 - Really understand C++ and vtables!
- Learning how vulnerabilities work gives you a foundation to avoid flaws in development
 - Why does a stack buffer overflow break / make a vulnerability
 - How can file access permissions be abused by attackers
 - How are cryptography failures exploited

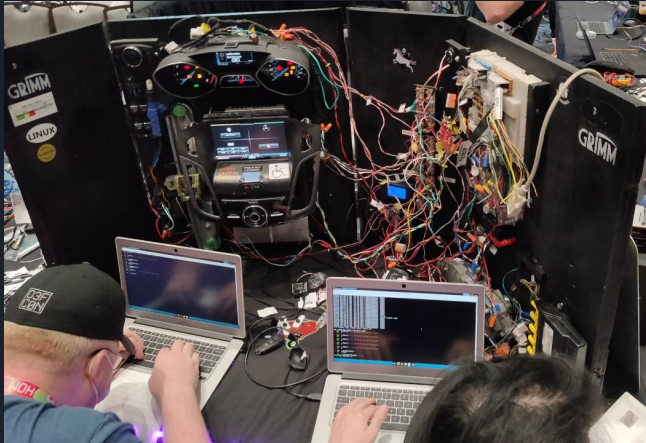
More things you can do...

- Hacking is just kinda fun
- Game hacking
- Reverse engineering software
- Software modding
- Fixing broken software / devices



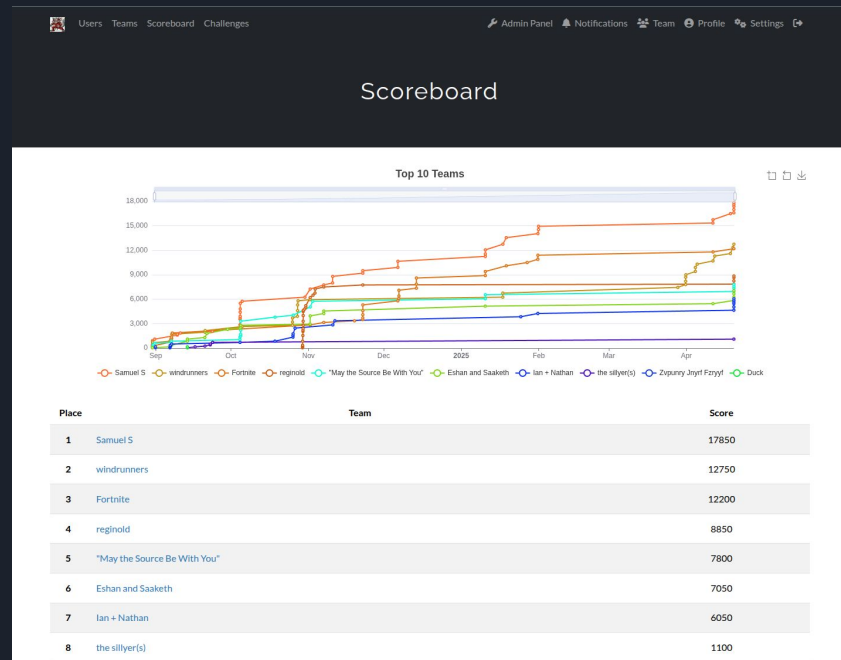
Capture the Flag (CTF)

- Hacking contest online or in-person (at security conferences)
- Attackers try to capture flag (secrets)
 - Via bug / flaw in organizers challenge
 - Forensic research
 - From other teams when playing attack and defend



Westshore Wildcat CTF

- Last year we had year long CTF
- Hosted on CTFd (scoreboard)
- Challenges in cloud
 - Digital ocean Linux server in cloud
 - Docker containers
- Spoiler Free CTF writeups
- Difficult for me to keep ahead of top players!





- Platform by former CTF players and ASU students (now professors)
- Heavily modified version of CTFd
- Part of ASU CS required curriculum

The Courses — Earning Credit

We leverage the above material to run a number of courses on this platform. For the most part, these courses import the above material, though some might introduce new concepts and challenges.

CSE 365 - Fall
2025

1 Module
149 Challenges

CSE 466 - Fall
2025

11 Modules
267 Challenges

CSE 539 - Spring
2025

7 Modules
44 Challenges

CSE 598 AVR - Fall
2024

7 Modules
62 Challenges

pwn.college | 🏠 Dojos 🖥️ Workspace ? Help 💬 Chat 🔍 Search



Getting Started — Learn the Basics!

These first few dojos are designed to help you Get Started with the platform. Start here before venturing onwards!

Start Here



2 Modules
11 Challenges

Linux Luminarium



16 Modules
126 Challenges

Computing 101



7 Modules
69 Challenges

Playing With Programs



4 Modules
116 Challenges

After completing the dojos above, dive into the Core Material below!

Core Material — Earn Your Belts!

These dojos form the official pwn.college curriculum, taking you on a curated journey through the art of hacking. As you progress and build your skills, like in a martial art, you will earn **belts** for completing dojo after dojo. We won't stop you from jumping around if you want (and have the requisite skills), but you must earn belts sequentially.

Intro to Cybersecurity



7 Modules
183 Challenges

Program Security



7 Modules
188 Challenges

System Security



6 Modules
93 Challenges

Software Exploitation



6 Modules
103 Challenges

After completing the dojos above, not only will you be added to the **belts** page, but *we will send you actual pwn.college-embroidered belts*!

To get your belt, **send us an email** from the email address associated with your pwn.college account. We'll then get your belt over to you (eventually)! Note that, due to logistical challenges, we're currently only *shipping* belts to hackers after they earn their blue belt. Until then, we will belt you in person, at ASU or some security conference.

How to enroll

- Sign up
 - Username / Hacker Handle
 - Email Address
 - Integrity Pledge
- Earn your white belt!



Start Here



2 Modules
11 Challenges

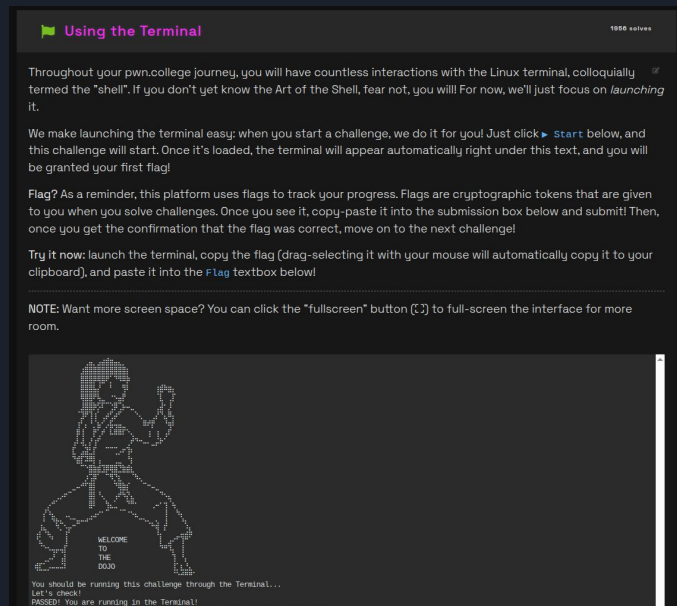
Linux Luminarium



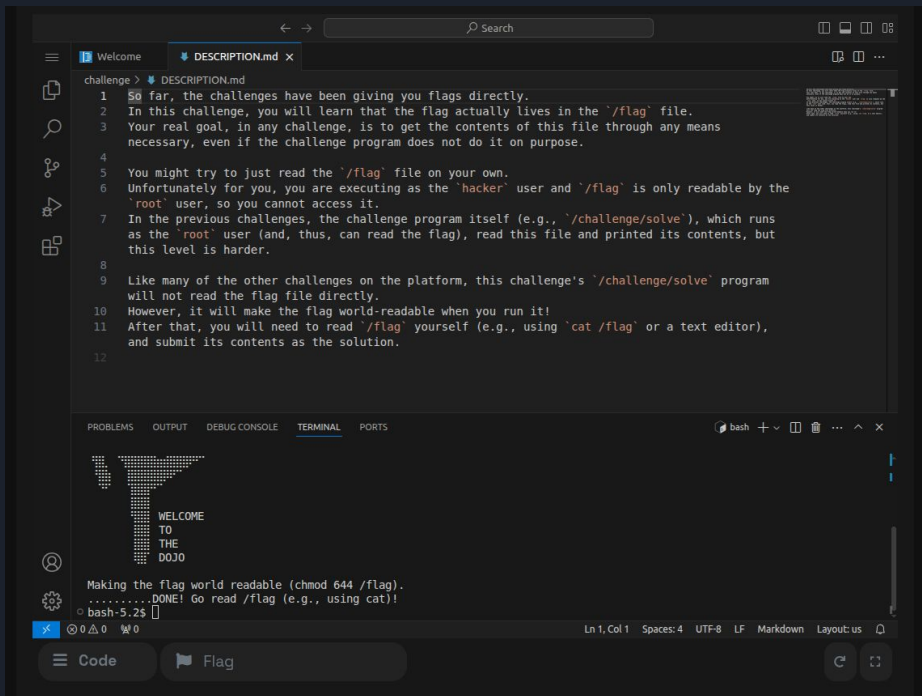
16 Modules
126 Challenges

Welcome to the Dojo

- Each dojo has submodules on different subjects
- Module contents
 - Youtube lecture
 - Google slides
 - Challenges
- Start the challenge
 - Web-terminal
 - VS Code
 - Desktop
 - SSH mode



Other options

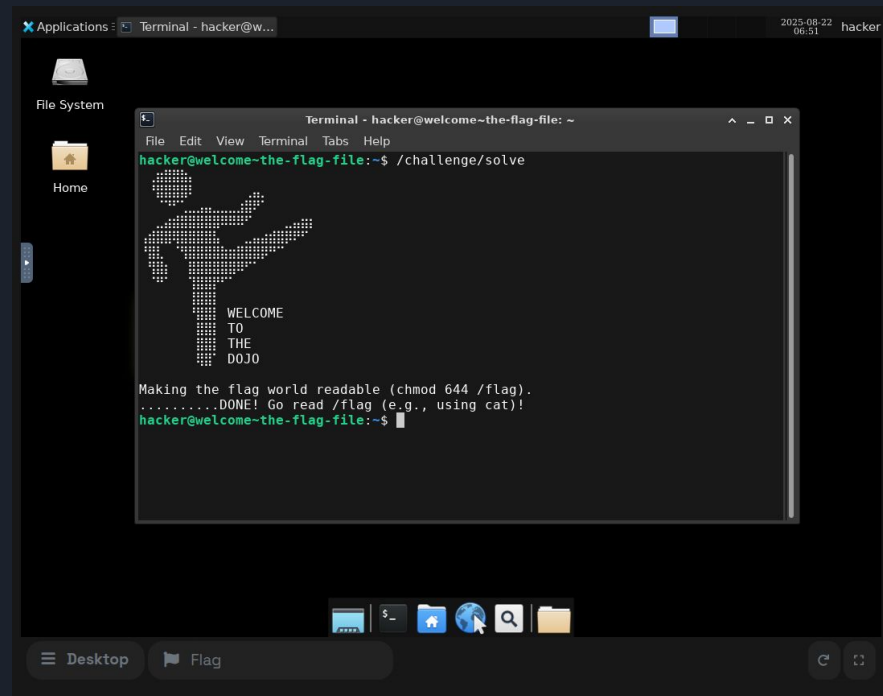


The screenshot shows a code editor with a file named `DESCRIPTION.md` open. The file contains a challenge description with 12 lines of text. Below the editor, there is a terminal window. The terminal shows a ASCII art of a person standing, followed by the text "WELCOME TO THE DOJO". Below this, it says "Making the flag world readable (chmod 644 /flag).DONE! Go read /flag (e.g., using cat)!". The terminal prompt is `bash-5.2$`.

```
challenge > DESCRIPTION.md
1 50 far, the challenges have been giving you flags directly.
2 In this challenge, you will learn that the flag actually lives in the '/flag' file.
3 Your real goal, in any challenge, is to get the contents of this file through any means
4 necessary, even if the challenge program does not do it on purpose.
5
6 You might try to just read the '/flag' file on your own.
7 Unfortunately for you, you are executing as the 'hacker' user and '/flag' is only readable by the
8 'root' user, so you cannot access it.
9 In the previous challenges, the challenge program itself (e.g., '/challenge/solve'), which runs
10 as the 'root' user (and, thus, can read the flag), read this file and printed its contents, but
11 this level is harder.
12
13 Like many of the other challenges on the platform, this challenge's '/challenge/solve' program
14 will not read the flag file directly.
15 However, it will make the flag world-readable when you run it!
16 After that, you will need to read '/flag' yourself (e.g., using 'cat /flag' or a text editor),
17 and submit its contents as the solution.
```

```
WELCOME
TO
THE
DOJO

Making the flag world readable (chmod 644 /flag).
.....DONE! Go read /flag (e.g., using cat)!
bash-5.2$
```



The screenshot shows a terminal window titled "Terminal - hacker@w...". The terminal prompt is `hacker@welcome-the-flag-file:~$`. The user has entered the command `/challenge/solve`. The output shows a ASCII art of a person standing, followed by the text "WELCOME TO THE DOJO". Below this, it says "Making the flag world readable (chmod 644 /flag).DONE! Go read /flag (e.g., using cat)!". The terminal prompt is `hacker@welcome-the-flag-file:~$`.

```
hacker@welcome-the-flag-file:~$ /challenge/solve

WELCOME
TO
THE
DOJO

Making the flag world readable (chmod 644 /flag).
.....DONE! Go read /flag (e.g., using cat)!
hacker@welcome-the-flag-file:~$
```

Westshore Dojo

1. Signup on pwn.college for an account
2. <https://pwn.college/dojo/westshore-cs-club~0b45ad3f/join/>



Modules

Pseudo Random
Number
Generators
(PRNG)

0 / 2

Hashing

0 / 2

Cryptography

0 / 6

Cracks and
Keygens

0 / 2

General Skills

1 / 2

Pwn

0 / 1

Coding

0 / 1

Reverse
Engineering

0 / 6

Forensics

0 / 1

Impossible

0 / 1

Arizona State University



- Computer Science (Cybersecurity), BS - 120 credit hours

Computer Science Lower Division
CSE 110 Principles of Programming (QTRS)
EEE 120 Digital Design Fundamentals
CSE 205 Object-Oriented Programming and Data Structures (QTRS)
CSE 230 Computer Organization and Assembly Language Programming
CSE 240 Introduction to Programming Languages
FSE 100 Introduction to Engineering
Computer Science Upper Division
CSE 301 Computing Ethics
CSE 310 Data Structures and Algorithms
CSE 330 Operating Systems
CSE 340 Principles of Programming Languages
CSE 355 Introduction to Theoretical Computer Science
CSE 360 Introduction to Software Engineering
CSE 365 Information Assurance
CSE 485 Computer Science Capstone Project I
CSE 486 Computer Science Capstone Project II
MAT 343 Applied Linear Algebra
IEE 380 Probability and Statistics for Engineering Problem Solving (QTRS)

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Plus CSE598 - Special Topics

- Fall 24-Applied Vulnerability Research
- Spring 24 - Advanced SW Exploitation

Cybersecurity Focus Courses
^ Upper Division Cybersecurity Focus Courses
CSE 466 Computer Systems Security
CSE 467 Data and Information Security
CSE 468 Computer Network Security
CSE 469 Computer and Network Forensics
CSE 494 Topic: Artificial Intelligence for Cyber Security
CSE 412 Database Management
OR CSE 434 Computer Networks
OR CSE 445 Distributed Software Development
^ Upper Division Cybersecurity Electives
CSE 445 Distributed Software Development
CSE 460 Software Analysis and Design
CSE 463 Introduction to Human Computer Interaction
CSE 464 Software Quality Assurance and Testing
CSE 466 Computer Systems Security
CSE 467 Data and Information Security
CSE 468 Computer Network Security
CSE 469 Computer and Network Forensics
CSE 471 Introduction to Artificial Intelligence
CSE 494 Topic: Artificial Intelligence for Cyber Security



Coursework -> Belts



- CSE 240 Intro to Programming Languages
 - Intro to Programming Languages Model
 - Linux, C, C++, Scheme (functional programming)
- CSE 365 Information Assurance
 - Will get all the way to the orange belt evaluation
- CSE 466 Computer Systems Security 🥋
 - Yellow, Green, and Blue belts?
- CSE 598 Special Topics
 - Applied Vulnerability Research
 - Advanced SW Exploitation



Arizona State University



- Much of pwn.college is integrated into ASU coursework
 - Pwn.college solve percentage is most / all of their students grade
 - See ASU academic integrity policy
-
- No write-ups
 - No solutions on Github
 - No sharing of flags (at least with ASU students)

Plagiarism and Cheating

Plagiarism or any form of cheating in assignments or projects is subject to serious academic penalty. To understand your responsibilities as a student read: [ASU Student Code of Conduct](#) and [ASU Student Academic Integrity Policy](#). There is a zero tolerance policy in this class: any violation of the academic integrity policy will result in a zero on the assignment and the violation will be reported to the Dean's office. Plagiarism is taken very seriously in this course.

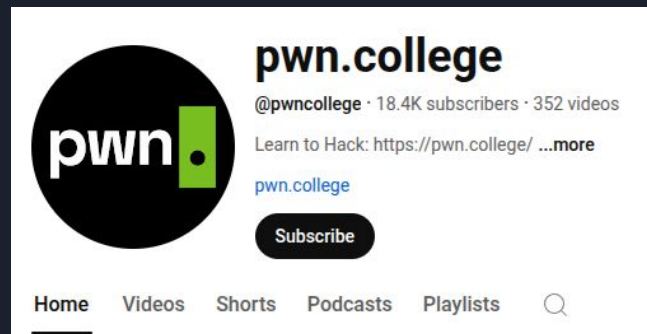
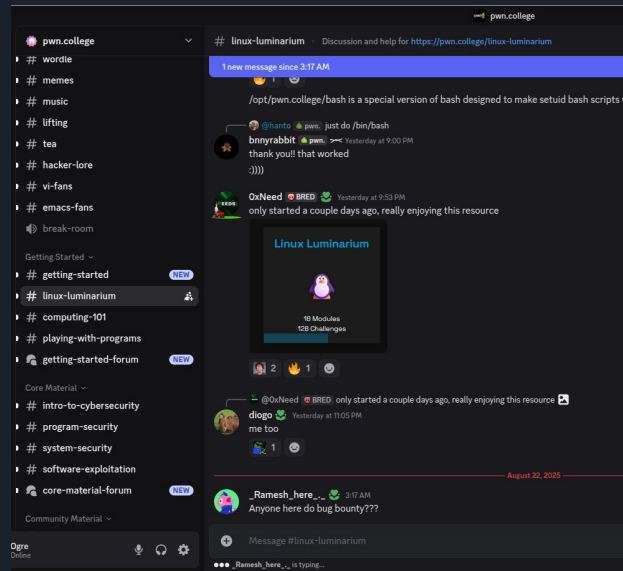
Examples of academic integrity violations include (but are not limited to):

- Sharing code with a fellow student (even if it's only a few lines).
- Collaborating on code with a fellow student (unless explicitly allowed).
- Using another student's solution to solve a challenge and get a flag.
- Sharing a flag with another student (NEVER ALLOWED UNDER ANY CIRCUMSTANCES).

Posting your assignment solutions online is expressly forbidden, and will be considered a violation of the academic integrity policy. Note that this includes working out of a public Github repository. The [Github Student Developer Pack](#) provides unlimited private repositories while you are a student, making it easy to begin with a private GitHub repository.

Hanto

Helpful and Nice to Others





Attributions

- <https://cybersecurityguide.org/>
- [DEFCON31-Defending KA-SAT](#)
- <https://forum.nhl94.com/index.php?/topic/34793-nhl-94-2025-edition-by-adam-catalyst/>