GSMST CyberDragons Yearlong Proposal

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1 List of Competitions

Here is a list of competitions that GSMST CyberDragons will participate in for the entire school year with their competition dates. This will also cover some insights we will gain from participating in these competitions in the field of cybersecurity and when we should start preparing for said competition.

1.1 CyberPatriot

CyberPatriot is AFA's signature defensive cybersecurity competition where you have to blah blah blah blah. Yeah ok we got it. It's basically all of our meetings in the first 2 months of the year, then we kinda move on to broader topics. And we gotta register our teams before July 1 to get a 20% discount, but we don't actually have to pay anything until November 1. But also according to Parv you have to pay to make the teams, so maybe we tell Ms. Rachkovskiy to do some magic: log into the mainframe and do some hacking to make five teams without paying until November but still receive the discount. During peak competition season we might need to reserve a FLEX period if people want it so yea.

1.2 CyberStart America

So basically some guys in the United Kingdom made this cybersecurity platform with a bunch of random problems on it right. and now they expanded their reach to the United States, but since Americans *Hate* cybersecurity and won't Participate without some of that good old dinero, they are offering cash prize for winners! This competition is asynchronous and lasts from October to April, so basically the entire year. we are bsaically just gonna encourage everyone *HEY GO CYBERSTART GO CYBERSTART* for the entire year and then ~~we~~ they get free monies.

1.3 Cyber Skyline's National Cyber League (NCL)

Cyber Skyline's National Cyber League (NCL) is a virtual cybersecurity competition and training platform. It is designed to provide participants, including students and professionals, with hands-on experience and practical skills in various cybersecurity disciplines. The NCL features a series of challenges that simulate real-world scenarios, allowing participants to develop and demonstrate their expertise in areas such as network security, cryptography, web application security, log analysis, and more. The NCL follows a gamified approach, where participants compete individually or in teams to solve a series of challenges within a given timeframe. These challenges are designed

to assess participants' technical knowledge, critical thinking, problem-solving abilities, and ability to work under pressure. The platform offers different difficulty levels, ranging from introductory to advanced, catering to participants with varying skill levels (Can you tell I ChatGPT'ed this yet?).

There are two competitions offered in the NCL event: the individual game and the team game. The individual game takes place from March 31 to April 2, and you can register whenever you want for the individual game, even during the competition period itself. For the team game, the competition period is April 14 to April 16, and you have to register starting In January By April 13 by 23:59 PM (Wait, why did I say PM if it's in military time?). It costs $35 per team for a max of two teams. We could recruit two teams and make each team member pay a hefty little fine along with that. And there's 7 members max per team. This competition also focuses on log analysis, network traffic analysis, etc.

1.4 Lockheed Martin's CyberQuest

I cba to write paragraphs for this competition because I quite frankly know nothing content-wise about the competition, and Chatgpt gave me a bunch of gibberish.

- It's free
- Two methods: virtual and in-person
  - Going in-person requires a field trip to ~~Ohio~~ Orlando, Florida, since that's the nearest location for the competition.
- There is a 2 team limit for virtual and in-person each (4 max).

1.5 US Cyber Challenge: Cyber Quests

Cyber Quests is a online competition allowing participants to demonstrate their knowledge in a variety of information security realms. The main benefit of this competition is that it has a niche quiz (the entire competition is basically a quiz) that deals *a lot* with networking. Registration opens in the end of January, and the competition is from mid-February to the end of March. Registration closes at the end of the competition. It's also free of cost. There are no "teams" for this either; you have to create an account and participate individually and asynchronously, similar to *CyberStart America*.

1.6 Technology Student Association's Cybersecurity Event

Ok I might be crazy to promote TSA since they are like our rivals, but hear me out. Their cybersecurity event is an asynchronous jeopardy-style CTF challenge that is essentially a ripoff of picoCTF. The idea here is the following: if we can somehow siphon Cyber-Dragons members into this event, we can smurf on everyone else in the country and basically get first place in the national TSA conference and SLC. The event registration begins at the beginning of the school year and ends whenever TSA events end.

1.7 DiceCTF

DiceCTF is an annual jeopardy-style CTF competition hosted in **early February** every year. The prize pool is $5000, and it is open to all students.

1.8 ASIS CTF

ASIS CTF is an annual jeopardy-style CTF competition organized by the ASIS (Academy for Skills and Information Security) team. There is no restriction on the number of team members, and the problems include: general security infomration (trivia), web hacking, modern cryptography, exploit, forensics, reverse engineering, steganography, *etc.* The qualification round is in **late September** and finals are in **December**.

1.9 ÅngstromCTF

ÅngstromCTF is another jeopardy-style CTF competition hosted by team Ångstrom. It holds a focus on binary exploitation, cryptography, reverse engineering, and web exploitation, with a few miscellanous questions. It occurs in **late April**.

1.10 CSAW CTF

CSAW CTF is one of the oldest and biggest CTFs. Jeopardy-style CTF, this competition is for students who are trying to break into the field of security, as well as for advanced students and industry professionals who want to practice their skills. The qualifiers take place from **September 8 to September 10**, but high schoolers cannot go past the qualifier round.

1.11 TJCTF

TJCTF is a jeopardy-style CTF competition that takes place in **late May** (probably after school is out/during finals). The categories in this competition are: cryptography, binary exploitation, reverse engineering, web exploitation, forensics, *etc*.

1.12 LA CTF

LA CTF is a jeopardy-style CTF competition hosted by UCLA. There is no size limit on teams, and non-UCLA students must compete in the Open division. The competition consists of a variety of competitive cybersecurity challenges in addition to relaxed events like typing competitions. It takes place in **mid-February** for 42 hours. What we think is really cool about this CTF competition specifically is that there are also prizes awarded for the best write ups to the challenges of the competition, and write ups include video walkthroughs. So, if we really wanted to tryhard this CTF, we could just make a bunch of YouTube videos with really high production value and potentially get some prizes from doing that alone. But the prizes for winning the *actual* competition are $500, $300, $200, and $100 for 1st, 2nd, 3rd, and 4/5th place, respectively. Another really cool thing about this competition is that there are going to be speakers on the UCLA campus streamed live for all the virtual participants. A notable name is *John Hammond*, who has his own YouTube channel for picoCTF stuff.

2 CyberDragons Syllabus

It is time for my favorite part, the cyberdragons syllabus, which I would have made whether it was required or not. We have already talked about what we want to cover on the syllabus for the entire year, but none of us have the leisure to start drafting a syllabus at this time (we cba), so we will probably work on it towards the end of July. Therefore, the deadline for the syllabus will be **August 1**.

2.1 Syllabus Research

Here is the syllabus research that we discussed as a collective during our meeting on June 2 at 9:01 PM. Approximately *66.66666%* of the meeting participants came prepared with three topics to cover for the syllabus and why those topics were important for future competitions and the broader aspect of cybersecurity. All we have to do now is figure out when we want to cover these topics and how we could structure our lesson plans for them, which we'll do in another meeting towards the end of July.

2.1.1 Anish Goyal's Research

- **Web Application Security**
  - Discuss common vulnerabilities in web applications, such as cross-site scripting (XSS), SQL injection, and cross-site request forgery (CSRF). Explain techniques like input validation and secure coding practices to mitigate these risks, or how to exploit them. This is important for picoCTF's *Web Exploitation* module and Cyberpatriot's *Boeing Web Challenge* that will have an approximately 99.9999% chance of being a part of next year's competition.
- **AES (Advanced Encryption Standard)**
  - It's the most widely used symmetric encryption algorithm and is employed in various applications, including securing sensitive data, protecting communication channels, and ensuring confidentiality in data storage. Throughout the years, we have seen forensic questions about AES in CyberPatriot and even some *Cryptography* and *Reverse Engineering* challenges in last year's picoCTF competition that involved AES encryption/decryption and salting.
- **Network Time Protocol (NTP) Security**
  - We want to learn how to security configure the NTP kernel module to synchronize system clocks with trusted time sources and prevent time-based

attacks, such as replay attacks or certificate validity issues. This is an important aspect of kernel hardening for Linux systems that is typically overlooked throughout the CyberPatriot competition, and we could even throw in some networking systemctl safety measures in there (e.g. Martian packet tracing and preventing IPv4 wait-time assassination attacks).

2.1.2 Bibek Bhattarai's Research

- **Hacking Tools**
  - Teach how to use commonly found exploiting software like Jack the Ripper, Wireshark, BurpSuite, and pwntools.

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Error at Line 59 (NullPointerException: Class "Bibek" with Attributes
↪  "Research Topic 2" and "Research Topic 3" Not Found)
```

2.1.3 Andrew Zeng's Research

- **General Encryption**
  - This topic is commonly covered through a unit within CSP, but to serve as a further step, CyberDragons can offer to focus on this topic towards the beginning of the year in order to serve as a transition from those who were initially piqued by the confines of the CSP curriculum and teach them about the various different encryption and decryption methods used by ethical hackers and cybersecurity defenders.
- **Network Defense**
  - Although one can work to troubleshoot a cybersecurity problem on their own, it's generally important for those to use and apply the tools already provided to them. This lesson could range from covering various firewalls, access control, how a network is split and can pertain specifically to Windows Server, Windows, as I remember from CyberPatriot.
- **Scripting (PowerShell and whatnot)**
  - Scripting is integral (I got calc PTSD reading that Cursed Word) pertaining to cybersecurity as it can often automate the process of breaking into or fixing common breaches that occur in the world.

3 CyberPatriot Applications

Just like last school year, we plan to have an application process for CyberPatriot CyberDragons. However, we will be diversifying the process a little bit this year.

3.1 The Main Application

Here is how the *main* CyberPatriot application for this year will work:

1) There will be three qualifying practice images that members must complete to the best of their ability in a two-week timeframe: one Windows, one Ubuntu, and one Fedora. The theme for each of these images will be PORTAL:

Figure 1: A portal-themed virtual image

2) Once the applicants are satisfied with their progress (or if the two week deadline is approached), they must email a screenshot of their results to the GSMST CS Club email address, which I cba to get right now.

3) The applicants have to fill out a Google Form with short-answer questions to complete that are completely qualitative in nature. I hate fluffy questions like "Why do you want to be here!" and "What experience do you have to offer!" so I will make sure the questions are a lot better than those piece of trash. And I'm not gonna kill the applicants either: completing three practice images is already a lot of work, so I'm only gonna ask for them to write like 2 sentences minimum per question.

4) Make sure the applicant can pay the $30 fee. On the Google Form, make sure they check a box that says "I can pay the $30 fee or ask Ms. Rachkovskiy for a fee waiver if I need one." Of course, this fee does not apply for members of Team Phi, and we're not even gonna say that the $30 is "a donation."

3.2 Team Phi Application

Next year, if an applicant wants to be in Team Phi, they have to fill out another Google Form! You might be wondering why we are making prospective members of Team Phi fill out another Google Form *in addition* to the main CyberPatriot application if our mission is to promote equity—well, the idea of another application is not to deter prospective Team Phi members; it is simply that we anticipate that the demand to get into Team Phi is gonna be so high next year (because of the nature that it is free of cost) that we have to make getting into Team Phi a separate application process altogether. We also want to remove the requirement that all members of Team Phi has to be members of Girls Who Code. While it is true that Team Phi was originally reserved solely for members of Girls Who Code, there might be a lot of female students out there who aren't expressly interested in Girls Who Code but want to participate in CyberPatriot, and we are thusly giving them the opportunity to do so. However, we will leave that decision up to Girls Who Code themselves, since they formed Team Phi in the first place ***(PASSIVE AGGRESSIVE SMILING)***.

3.3 CyberPatriot Team Leader Application

Last year, we had a team leader for each team in CyberPatriot, and all of them were club officers. This year, especially since we only have three cybersecurity officers, we have opted to allow CyberPatriot participants *themselves* apply for leadership positions. This gives each team a degree of autonomy to which they can function, and a chance for CyberDragons members to put something nice on their resume (e.g. "I led a CyberPatriot team to semifinals!!! Omg, I'm the GOAT of all time!"). But of course—like all great things in our lives—there will be a Google Form allotted (alloted?) for this purpose. And five people will be accepted, one for each team. Oh, and they have to be a returning

member because there is no way in ~~hell~~ heck that we are going to make someone with no CyberPatriot experience a leader. You need to know what you are doing, and it is a huge responsibility to drive people in the competition, cause if your team is lost, your team is doomed to fail.

4 CyberPatriot Team Distribution

With the addition of Team Zeta next year, we have to consider how we are going to distribute members across all five of our CyberPatriot teams. Well, actually, the solution here is simple. Most, if not all of our CyberPatriot members last year filled out the *returning member Google Form*. This means that we can reserve a spot for them on their original teams without moving them whatsoever (assuming they actually go through the aforementioned application process). Then, we put all the newbies in any spots not reserved for members that filled out the returning form.

5 A New Approach to Teaching

GSMST CS Club's cybersecurity department was a massive success last year, but there was one massive pitfall: we taught students cybersecurity concepts to excel in competitions, but they often didn't retain the information taught at these seminars. However, they *did* remember cybersecurity approaches from messing around in virtual machines and scoring points. This year, we aim to take a more hands-on approach to cybersecurity. We will no longer have seminars—we will have workshops. Not only will this will solve our main problem last year—disappointment from students who did not get into CyberPatriot or joined later in the year, since we will be in more than triple the amount of competitions—it will also solve the problem of audience retention, since we will be taking a learn *by* doing approach instead of a learn then doign approach.

So what does this mean, and how do we plan to implement this? Firstly, this means that our workshops will not be curated specifically for a competition. It will be generic cybersecurity concepts that will be useful in preparing for various competitions, but not something labeled as a "CyberPatriot" or "PicoCTF" meeting. And in order to implement interactivity, we can use virtual desktop software on a 24/7 server (managed by my old laptop) that will control any virtual machine for people to mess around with, CyberPatriot style! This gives us the infrastructure for mini practice images for students to tackle during workshops and even networking challenges with WireShark and Cisco Packet Tracer. We can also use platforms with response validation like Desmos to generate interactive lessons for students.

6 Discord Server Revamp

Since we're no longer GSMST CyberPatriot CyberDragons, we're just gonna call ourselves GSMST CyberDragons, since we're in multiple competitions. And now we got ourselves an awesome logo:

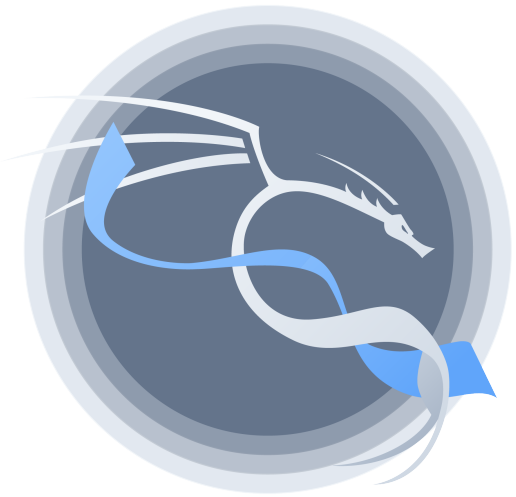


Figure 2: GSMST CyberDragons logo made by the esteemed Yubo Cao

For now, i cba to revamp the server to CyberDragons. But I will do it in the upcoming weeks, Definitely by July 1. It's basically just making some new text channels so that its less curated specifically for CyberPatriot and moreso the competitions we participate in in general. And changing the name and logo.

7 CyberDragons-Curated Competitions

The CyberDragons administrative team will create competitions to inspire camaraderie (I hope that's how you spell it, I cba to check) among teammates and prepare for actual competitions. The competitions we propose are the following:

7.1 CyberPatriot Mock Competition

This is a competition that we plan to have sometime between the first and second CyberPatriot round. We cannot have a mock competition between the second round and the state round because of midterms and conflicts with the SAT, but a mock competition between the first two rounds is definitely doable. I don't have an exact month for this right now, but it would have to take place on a Saturday for 6 hours between the first two rounds, and we would have 3 images (Windows, Ubuntu, and Fedora) and a Cisco Packet Tracer Lab (.pka file).

7.2 In-House Infosecurity Competition

We are gonna host a competition that is a copy of CyberPatriot without calling it *"CyberPatriot"* (Genius, I know right?). It's gonna take place on a Saturday for 6 hours in April, which surprisingly has a ton of dates to schedule things. It will be *Lord of the Rings* themed with the same 3 images (but no Cisco Packet Tracer this time, good riddance!).

8 Cisco Packet Tracer

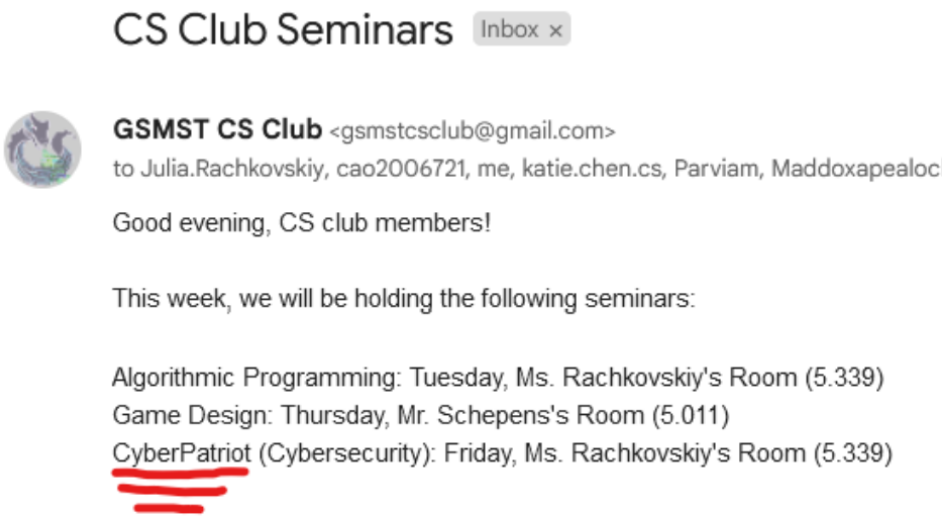
Speaking of Cisco Packet Tracer (my favorite part of CyberPatriot), we have taken measures to ensure that Cisco will not be overshadowed by the rest of the competition next year. AFA is actually really nice and tells us which NetAcad modules are covered on the quizzes for each CyberPatriot round ahead of time, so we can prepare some slideshow presentations/notes for people to read through in order to ~~cram~~ get ready for that aspect of the competition. There's also a ton of mentors that I'm on the look out for. I've scouted LinkedIn and found a couple of mentors that might be interested in helping us, such as Binh Tran (Who you might know as a Gwinnett Technical College professor). There's also Mr. Hong, who coaches ACSL, who apparently has Cisco and networking experience, despite not using packet tracer himself.

9 picoCTF

Last year, the picoCTF meetings faced a lack of attendance: in fact, it was our lowest attending seminar on average **by far**. It seemed that the popularity and attention given to CyberPatriot overshadowed picoCTF, making it difficult for people to make it to the Thursday meetings. Unfortunately, this resulted in a disappointing turnout. Recognizing this issue, we decided to remove picoCTF as a regular meeting day altogether.

However, we devised a solution to ensure that picoCTF received the attention it deserved during the competition season this yera. Rather than holding regular meetings on Thursdays, a few Fridays would be dedicated specifically to picoCTF. This adjustment would provide an opportunity for participants to focus on the competition and engage with picoCTF-related activities. Additionally, a couple of FLEX periods could be allocated for picoCTF, allowing students to further immerse themselves in the preparation and training required for the competition.

In the past, we've always referred to our Friday meetings as *CyberPatriot* meetings:


CS Club Seminars Inbox ×

GSMST CS Club <gsmstcsclub@gmail.com>
to Julia.Rachkovskiy, cao2006721, me, katie.chen.cs, Parviam, Maddoxapealoc

Good evening, CS club members!

This week, we will be holding the following seminars:

Algorithmic Programming: Tuesday, Ms. Rachkovskiy's Room (5.339)
Game Design: Thursday, Mr. Schepens's Room (5.011)
CyberPatriot (Cybersecurity): Friday, Ms. Rachkovskiy's Room (5.339)

Figure 3: An email from last year containing our seminar schedule. Notice how it says "CyberPatriot."

However, a lot of the content that we covered in our "CyberPatriot" meetings weren't even related to the actual CyberPatriot *competition*—they were just cybersecurity concepts in general. Furthermore, a lot of the topics covered in picoCTF overlapped with the topics we brought up in CyberPatriot in general. Therefore, it's better to just merge the two into a new seminar called *"Cybersecurity"* every Friday, covering concepts in both offensive and defensive security.

10 Budgeting

GSMST CS Club is broke. And we incurred a lot of debt because of CyberPatriot last year. But now, we have a sustainable plan to make sure that doesn't happen again.

We have two competitions this year that require payment:

- **CyberPatriot:** $160 * 4 teams = $640
- **NCL:** $35 * 3 teams = $105
  - Apparently Bibek is going to help pay for this competition out of pocket?

We believe a **one-time member fee** of **$30** should work for participation in both of these competitions by CyberDragons participants, and they pay this on registration unless they have a fee waiver from Ms. Rachkovskiy or are in Team Phi. Yeah, that's pretty much it: $30 from everyone who wants to participate in these competitions should be more than enough. If someone that is *not* in CyberPatriot wants to participate in NCL, we believe a **one-time fee** of **$5** should do the trick, since each team can have up to 7 members, and breaking even is actually still making a profit in this case, since we accrued all that money from CyberPatriot to begin with.

11 Conclusion

CyberPatriot, picoCTF, and any other competition that GSMST CyberDragons competes in will be great this year. I envision great success for everyone this year, and I can't wait to see GSMST CS Club grow even further.