

## Course Title

## Course Code

**Introduction to Capture the Flag (CTF)**

**ITL-CTF**

### Background



HKSAR government promotes the innovation and information technology for secondary school. As it's high demands on how our society encourages Hong Kong teenagers to be the new force group in participation in the Information security industry sector. Security is critical to the success of businesses and Information technology and information security Industry adoption. The resilience of production processes strongly depends on the companies' awareness of the current threat landscape and the employed security framework for protecting against attacks. In Hong Kong, STEM education is promoted through Science, Technology and Mathematics Education. Hence, Technology is one of the important subjects for teenager to understand more about Cybersecurity. The introduction and fundamental knowledge of Cybersecurity definitively belongs to one of most important area that allow students and parent with additional considerations for the student's life planning within the study life of secondary school.

### Intensive demand on IT professional

Due to international demand for information security professionals across educational institutes, NGO, Enterprises are high. How about if we can enable our Hong Kong teenager starting to look into one of the high demanding industries as one of the shortcuts to allow them to have earlier exposure on Information security. It can also validate the knowledge required for entry-level network security positions.



Source: Data Security Challenges 2021

According to the current report of (ISC)<sup>2</sup> ([www.isc2.org](http://www.isc2.org)) Cybersecurity Workforce Study 2020, the global Cybersecurity workforce is now in a shortage of 3.12 million professional. Except for the mentioned APAC Countries, the United Kingdom is one of the countries in the world that focus on the development of teenagers' education in cyber security perspective. There is a scheme (CyberFirst) especially targeting age group 11-19 young peoples in order to develop the UK's next generation of cyber professionals through the student bursaries.



## Education & skills

11 - 19 year olds (CyberFirst)

[Young peoples in CyberFirst<sup>\[2\]</sup>](#)

Apart from the CyberFirst schema, it's also has a competition targeting girls' sector, i.e. CyberFirst Girls Competition. It provides an interesting but challenging environment to inspire the next generation of young women to consider a career in cyber security.



Another organization, [Youth Fed<sup>\[3\]</sup>](#) is a youth charity that supports over 5,000 young people between the ages of 8 and 25, helping to improve the lives of young people through celebrating and delivering activities. We enable young people to thrive and achieve their full potential, regardless of background or circumstance. With the mission and vision that, promoting the Youth Fed Cyber Programme is an exciting initiative running in the North West of England.

The programme has two main focuses:

To inspire potential talent, creating a pipeline for the cyber security industry to respond to the skills gap.

To make people safer in the digital world.



The Cyber Programme is run from two fully equipped Security Operations Centre's (SOCs) – one based in Salford and one in Daresbury. At the SOC's, our Youth Fed operatives run a series of workshops starting with the Cyber Security Taster Session. Youth Fed with objectives are: To advance in life and help young people through the provision of recreational and curriculum enriching activities provided in the interest of social welfare, designed to improve their standard of living.

## IT Innovation Lab



In Hong Kong, we do have a similar supporting scheme brought to us from the Hong Kong Government. The OGCIO of the Hong Kong government invites the majority of secondary schools to participate in the "[IT Innovation Lab in Secondary Schools](#)" <sup>[4]</sup> Programme. This schema aims to thereby promoting local popular science education and expanding the supply of innovation and technology talent and meet the needs of a technology-driven society.

## Training courses providing

Our training course is teaching the teenagers understand what cybersecurity is. Though those cybersecurity related training courses, the students may raise their interest in cybersecurity related subjects in their tertiary education. By attending this course, secondary school could be much easier to promoting the aspects related to the cybersecurity. In order to allow more teenagers starting to understand what's cybersecurity about. It helps secondary school to enhance their students to participant worldwide cybersecurity competition and also increases their reputation so forth. Students may have chance to visit VTC (Cyber Range Security Lab) & HKIT (Cyber Security degree and diploma courses) or education seminar as well.

We are providing four courses that includes Introduction to CTF, Cybersecurity Essential, IoT security, IoT Lab (ONWARD).

### Courses Supporting Companies / Organizations



This course is about ‘**Introduction to CTF**’, for other courses please refer to correspondence course material.

\*\*\*\*\*

CTF main value focuses on the science, technology and engineering and addressing by the following elements: Cryptography, Website hacking, Reverse Engineering, Steganography and Forensic. Before secondary school students capable to participant the open competition of CTF. Then start from the beginning, basic understanding of cybersecurity would be required to bring the attention to the students.

The world’s first global CTF competition was held in 1993 at DEFCON. It consists of a series of cyber security challenges for the contestants to compete. In this CTF training course, our experts teach the secondary students what is Security Knowledge and Ethical Hacking Techniques to increase the interest of Cyber security among the students in order to encourage teenagers to enhance their innovative, creative thinking with an IT learning atmosphere at the life of secondary school.

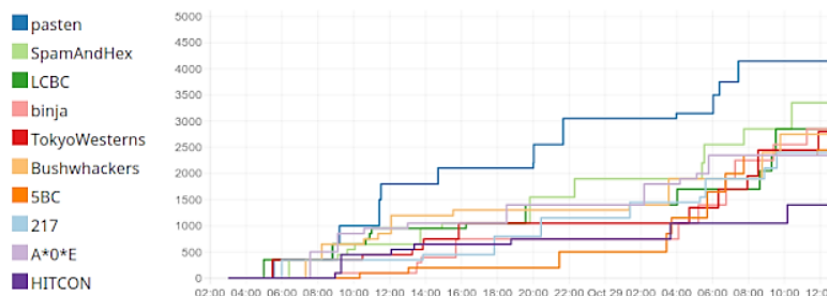
Many of them are rank-high in the International CTF competition. Through CTF Training, Cyber Security is promoted among the secondary students.

[DEF CON 2017<sup>\[1\]</sup>](#)



Google is an American multinational technology company that specializes in Internet-related services and products, which also supports CTF competition in the world. There is a scoreboard shown the ranking of different teams in Google CTF 2017.

## Scoreboard



[Google CTF 2017 Scoreboard<sup>1</sup>](#)

- During the course, a real CTF battlefield setup for the students to play around
  - Questions will be refreshed weekly
  - Not stop competition
  - Real time Scoreboard
  - Ranking

There is a Hong Kong Cyber Security New Generation Capture the Flag (CTF) Challenge 2020 jointly hosted by HKCERT & HKPC that contest to arouse the cyber security awareness of the education sector and encourage student problem solving with teamwork.



It is total 541 participants attended this CTF challenge. Hereafter, the contest aims to introduce a brand-new learning model to allow more teenagers to understand that CTF is a fun game to play instead of test, encouraging participants through teamwork, research, creative thinking, with the use of tools & programming, can-do attitude, trial & error to solve problems.

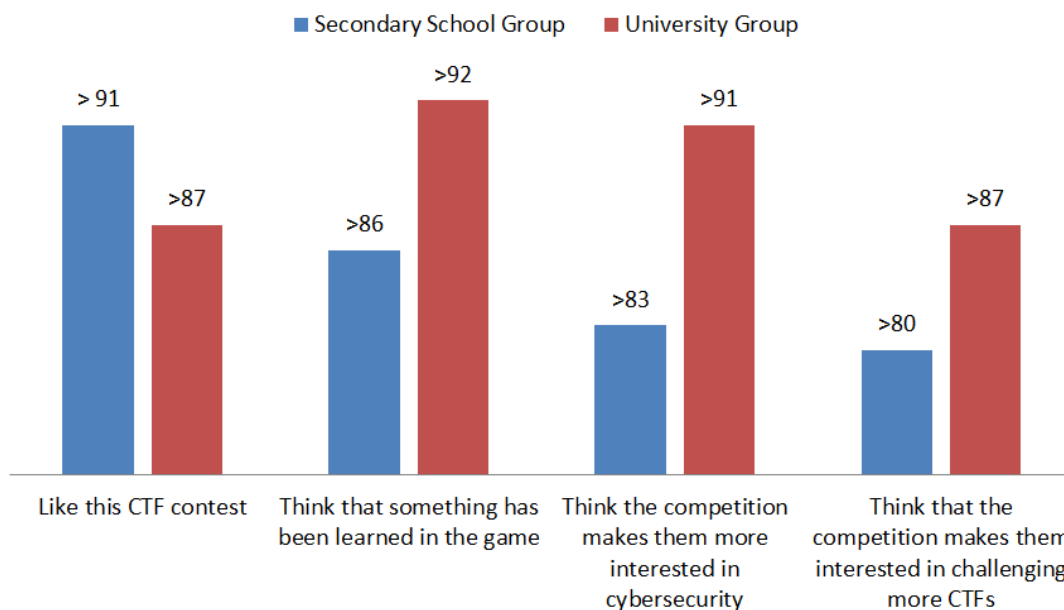
The result of the challenge: University group contest, HKUST team was solved for 38 challenges out of total 44 challenges and took the champion places and followed by PolyU team. There is another group for secondary school participants. The competition is extremely fierce due to the 1<sup>st</sup> and 2<sup>nd</sup> place fighting to the last minutes and finally were won by Carmel secondary School. There are seven delegation teams representing Carmel secondary school, that's within top 30 in rank.

---

<sup>1</sup>

Figure Statistic: Survey responded from all participants

### Survey - How popular of this CTF contest



From the statistics result and information collected, both University and Secondary school groups expressed that over 88 % of the groups like this CTF contest and over 87% of the groups think that they have learned something in this CTF contest. We can also see that briefing sessions, pre-competition workshops and trial sample questions & problem-solving skill, the registration response was greatly improved. By introducing what is CTF, it can lead to attracting more teenagers to look into CTF related challenges, and hence allow them to dive deeper in the information security field. The success of this contest proves that Hong Kong teenagers have deep potential waiting for further development. We can imagine if the secondary school students interested in cybersecurity and also involve more on the worldwide competition, it can enable to them to be more ready in their career path. For secondary school, it can be recognized as one of great value to enable their students with better life planning. After attended this course, students will be able to demonstrate their CTF skill upon school orientation day, open day in order to add fruitful session into the relevant school events.

What we would like to promote is the Hong Kong young peoples' interest in Information technology especially in the aspect of Cyber security during their secondary schooling.

Our teaching team is backed by multiple CTF international organizations such as PICO CTF, HK CTF Association, HK CTF Advisors, and Taiwan HITCON. Shenzhen E-link(深圳易聆科) (E-link is an experienced education institute that focus on education sector in Information Technology. E-link hosts big scale CTF competition in mainland China every year.)



[HK CTF Association](#)<sup>2</sup>

[PICO CTF](#)<sup>3</sup>



### Backup by Local Experts

Advisor committees:

Ken Li: HKUSpace

Mr. Charles Mok

Mr. Vincent Yiu (an ethical hacker)

Mr. Kinsey Ng (Chaiwan VTC)

Dr. Lau Wing Cheong (CUHK)

Dr. SM Yiu (HKU)



Mr. Ken Li



Mr. Charles Mok



Mr. Vincent Yiu



Mr. Kinsey Ng



Dr. Lau Wing Cheong



Dr. SM Yiu

### Backup by HITCON Taiwan

Advisor committees:

Mr. Allen Own

Mr. Orange Tsai

Mr. C K Chen

Mr. Ching-Hsiung Hsu

Mr. Jeff Hu

Ms. Tina Lee

(All those advisors are active committees of HITCON Taiwan)



Mr. Orange Tsai



Mr. Allen Own



Mr. Ching-Hsiung Hsu



Mr. C K Chen (陳仲寬)



Mr. Jeff Hu



Miss. Tina Lee



### Course Objectives

2

3

This is an interactive cyber security training course that helps you understand what does CTF look like, during the CTF training, student will be able to understand the CTF technique consists of attacks and defence work, the tactics that CTF participants employ, how to spot and avoid a overlook the CTF challenges and most importantly you'll be understand how to participant in CTF competition and improve yourself and less vulnerable to cyber security attacks by understanding how it work.

## What Can Be Learned

- What is CTF?
- Types of Cyber security challenge in CTF
- How to be an Ethical Hacker?
- Know-how Common CTF technique.
- How to turn it into a Career path?
- Remote Mock exams.
- Participate in Battlefield.
- CTF competition.

## Further Study Path

After completing this course, students will be able to demonstrate CTF skills related to cyber security techniques in the manner of how to participate in CTF. There is an advanced course that includes the introduction of the Internet of Things (IoT) device and basic programming concept on Raspberry Pi 4.



There are popular CTF challenge types related to Remote IoT that make use of Raspberry Pi 4. Hence, for the students who are interested in deeper study on how the IoT works in CTF, it's a good chance to have a more specific exposure of IoT. The common IoT components are:

- Hardware: The Smart Device or Gateway
- Web apps, Mobile apps, Cloud assets
- Firmware
- Radio communication.

In which we will look into how those components are involved in CTF challenges.

## Target Audience

- All young peoples that study in secondary school (recommended for F.3 to F.6 students)

## Prerequisites

- Using Internet / email service experience
- A mobile smartphone with WIFI / internet connection

## Course Content Highlight

- Introduction to HK Laws related to Cyber Security
- What is an Ethical Hacker?
- Introduction to Career Path to be an Ethical Hacker
- Introduction to Vendor Neutral Professional Certification Program
- Introduction to different types of Cyber Security challenge in CTF on
  - Cryptography
  - Website hacking
  - Reverse Engineering
  - Steganography

- Forensic
- Miscellaneous
- Introduction to CTF competitions
- Mock Exam
- CTF Battlefield

## Trainers

### Frankie Leung

- CISSP, CISA, CISM, CRISC Certification holder
- Over 30 years' experience in IT, Security and Application Development
- WEPRO180 -資安長老 (<https://bit.ly/384SxIY>)

### Paul Chow

- CISSP, CEH, OSWP Certification holder
- Over 30 years' experience in IT, Security and Application Development

### Eric Moy

- CISSP, CEH, CISA, PRINCE2, ITIL and ISO20000 Certification holder
- Over 30 years' experience in IT, Security and Service Management

### Michael Chow

- CISA, CISM, CRISC, PRINCE2 and ITIL Certification holder
- Over 20 years' experience in the Information technology and services industry.

## Medium of Instruction

Cantonese (complemented with English terms)  
*(English terms will be used where appropriate)*

## Course format:

- To deliver thru online Instructor-Led deliver thru Zoom video conferencing platform.
- Online (Every two Weekends 2 hours, Max.XX students per class)
  - Cryptography (2 sessions)
  - Steganography (2 sessions)
  - Forensic (1 session)
  - Reverse Engineering (2 sessions)
  - Miscellaneous (1 session)
- On Site, cater the hands-on lab exercise topic (at the School Computer Room, 3 hours, Max XX student per Class, based on the arrangement with participated schools)
  - Website hacking (2 sessions)



## Course Duration:

	(Online 8 sessions * 2 hours) = 16 hours (Onsite: 2 sessions * 3 hours) = 6 hours, total = 26 hours.
Total	22 hours (included online and onsite classes)

## Key takeaway

- All students will have HKCTF Student membership (free of charge, worth HKD150 annual fee) automatically to enjoy all HKCTF events free of charge. [www.hkctf.org](http://www.hkctf.org)
- Top three Students will be sponsored to join CTF challenge organized by Shenzhen E-link(深圳易聆科).

## Class Size

40 persons per class

## Award of Certificate

Candidates will be awarded a certificate of attendance after the workshop.

## Enquiries

Please call sales enquiry at (852) 2565-3030 or email to [enquiry@microware.com.hk](mailto:enquiry@microware.com.hk)

Website: <https://www.microware.com.hk/>