NEW!

AI Champions Bootcamp

WOG Pilot Run

Registration Close: 26th July 11:59pm

Programme Start: 29th July (Week 1)

START

GOVTECH
SINGAPORE

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AI Champions Bootcamp is a programme consisting of:

i. **2 months online training** where participating officers level up their use of Generative AI, particularly **Large Language Models (LLMs),** followed by

ii. **1-month project phrase**[1] to apply their new-found skills to develop a **proof-of-concept (PoC) apps** based on use cases.
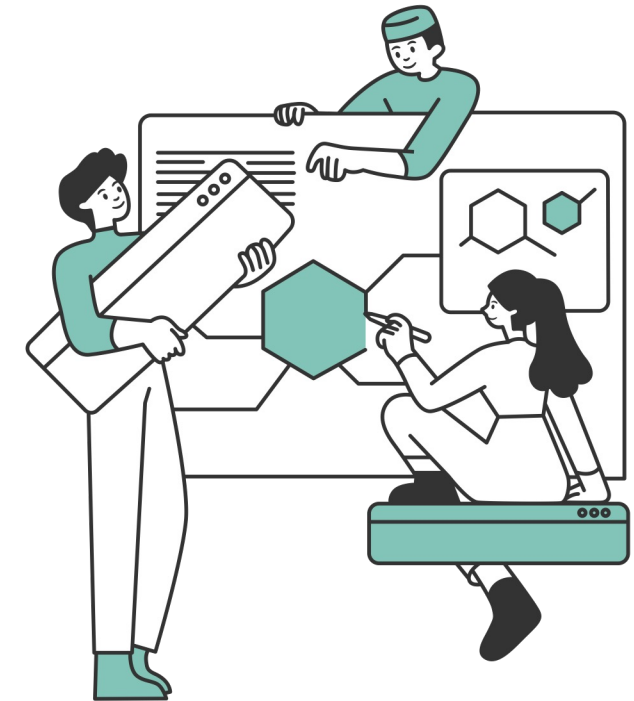
[1]*The project phase is a mandatory part of the programme. For more details, see slide " "What Proof-of-Concept Prototypes to Build?"*
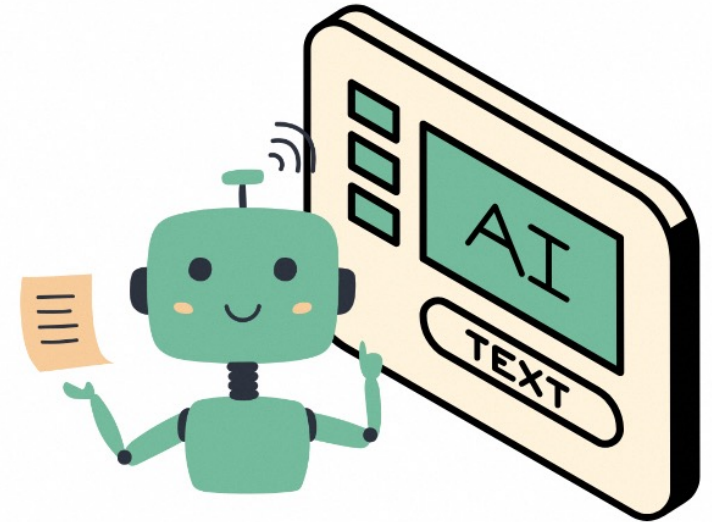
Through the bootcamp, participants will **build proficiencies** in:

- ✓ **Using Large Language Models & Prompt Engineering**

- ✓ **Building custom LLMs pipelines
for specific workflow or business need**

- ✓ **Building proof-of-Concept (PoC) apps using popular frameworks such as Langchain, Crew.AI or <u>Streamlit</u>**

Who the AI Champions Bootcamp is designed for

Highly motivated officers who want to upskill themselves to go beyond the using Generative AI products, **to have the skills & knowledge to create AI solutions that can benefit their work areas.**

I am an **ICT&SS personnel** who is familiar coding, databases, and other IT operations.
I want to be able to integrate AI solutions into the current applications or workflow

I love data analytics and visualizations, now I want to venture into Large Language Model(s) and leverage it to **solve business problems especially those long-standing ones so if we can build a solution that specifically addresses our needs.**

Learning Outcomes

- **[Primary Outcome]** Officers who have **the skills & knowledge on GenAI** to **turn ideas into Proof-of-Concept (PoC) Prototypes**.

    - They are capable of **applying GenAI technologies to develop Innovative solutions** for the challenges faced by their agencies

    - By **developing high-fidelity prototypes** that **demonstrates how the proposed solution works** to stakeholders

- **[Secondary Outcome]** Officers who are also **advocates for the adoption of AI** within the organization.

    - They can effectively demonstrate the applications and benefits of AI projects to a diverse range of stakeholders.
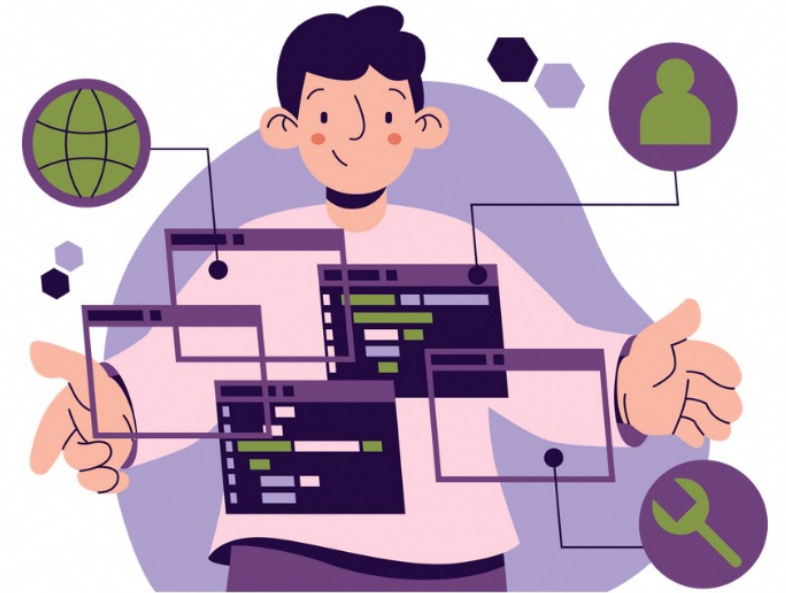
Overview: Topics Coverage
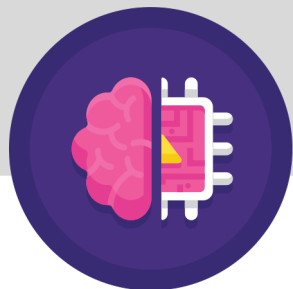
Large Language Models

- Overview of LLMs
- Prompt Engineering Techniques
- Key Parameters for LLMs
- Tokens and Embeddings
- Contents Similarity and Retrieval

- Extra: Getting Started on open-source LLMs

Build LLM Workflow

- Structured Inputs & Outputs
- Prompts Chaining and Routing
- Retrieval-Augmented Generation
- Evaluation and Moderation
- Agent with Tools
- Multi-agent System

Build AI Solution

- Web Application development with *Streamlit*
- Deploy app on *Streamlit cloud*
- [Optional] Dockerize applications into deployable containers

Prerequisites for the Participants

- Participants are **required to have the basic coding background in Python** (such as alumni of DC Bootcamp, related job roles, or equivalent courses).

- This programme **involves extensive level of coding** and **assumes participants already familiar with basic Python**. This prerequisite is to ensure the participants to be able to focus on the core content.

- Officers can **fulfil the prerequisites or refresh their Python coding**[1] by taking the course below on *Udemy Course via CSC LEARN app **before the start of the Bootcamp***

- *The Complete Python Bootcamp From Zero to Hero in Python*
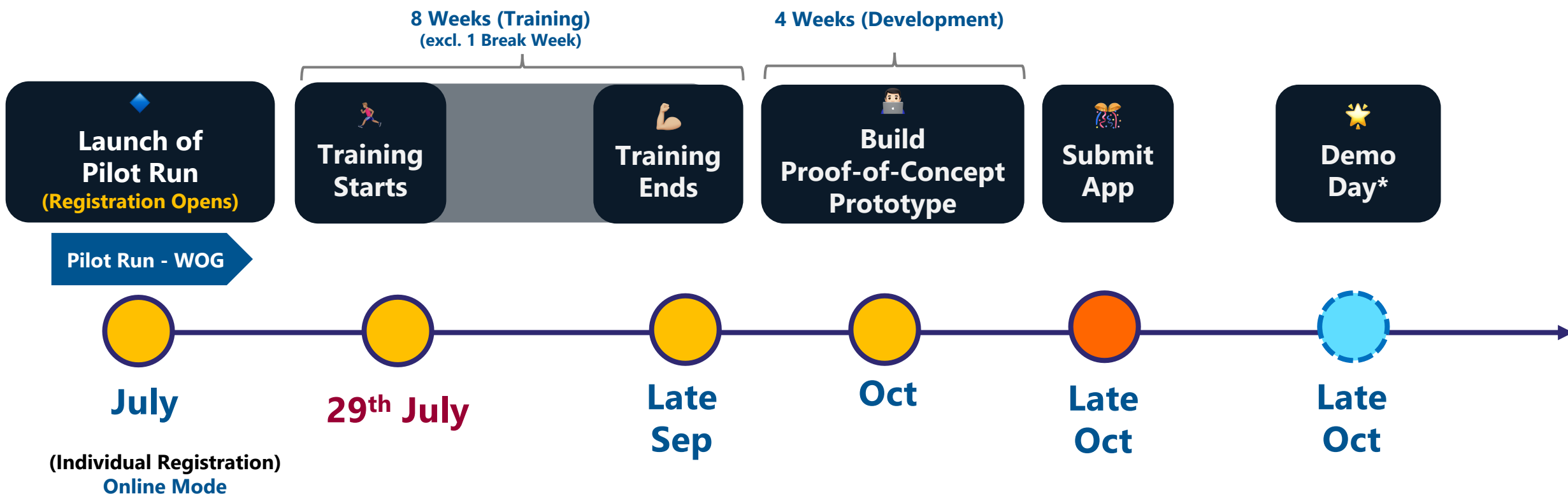 – About 22 hours

🐍 **Python Fundamentals**

- Python Objects (dictionary, list, array)
- Logical and comparison operators
- Flow control and loops (if else, loop)
- Functions and modules
- Directory and file operations

[1]*Participants who have learnt basic Python but have not been applying it in the past 1 year are strongly recommended to go through the course.*

Overall Timeline & Important Dates (2024)

8 Weeks (Training)
(excl. 1 Break Week)

4 Weeks (Development)

| 🔷 **Launch of Pilot Run** (Registration Opens) | 🏃🏽‍♀️ **Training Starts** | 💪🏽 **Training Ends** | 👨🏻‍💻 **Build Proof-of-Concept Prototype** | 🧑‍🤝‍🧑 **Submit App** | 🌟 **Demo Day*** |

Pilot Run - WOG

July — (Individual Registration) Online Mode

29th July

Late Sep

Oct

Late Oct

Late Oct

- *Demo Day is applicable to <u>selected</u> participants whose PoC prototypes are based on (i) agency's project or (ii) LAUNCH! Ideathon.
- See slide "***What Proof-of-Concept Prototype to Build?***" for the different options for PoC Prototypes.
- Given the limited capacity of the Demo Day managed by the GovTech team, we encourage **agencies with a significant number of participants to arrange their own internal demo days**. This approach offers several advantages: **it allows the agencies to have flexible schedule for a more focused group of audience, ensures greater privacy for your agency's projects, and provides an equitable opportunity for officers from your agency to showcase their projects aimed at improving their work areas within the agency**. We will provide Agencies who are keen to arrange their own demo day with the details of projects and teams from their agency.

Commitment during the 8-Week Training Phase

- **Weekly Commitment for participants:**

  A. About **3-4 hours** on online learning materials, including hands-on tasks [**required**]
  B. If needed, about **2 hours** to attend weekly **Q&A sessions**[1]. [**optional**]

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Learning Materials are released to participants (may be released earlier once ready)				*B) Q&A Session[1]* *10 a.m.*		
A) Self-learning materials (3-4 hours)						

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Details of Topics During Training Phase (cont.)

Week	Description	Comment
1 **Starts on 29-JUL**	• **LLM & Prompt Engineering** • **Calling/Using LLMs Programmatically** • Using LLMs programmatically (with OpenAI APIs) • Formatting prompt template in Python (triple quotes and f-string format) • Apply Prompt Engineering for specific tasks	Hands-on with notebook **Learning Outcome:** • Discover the use cases of LLM solutions • Learn and apply prompt engineering framework or techniques • Learn to use LLMs programmatically to efficiently handle repetitive tasks or a sequence of inputs.
2 **Starts on 5-AUG**	• **LLMs and the Parameters** • Token • Temperature, • Top-K, Top-P, and other parameters • **Prompting Techniques for Builders** • Include structured data in the prompt (e.g. Excel, CSV, HTML Table) • Parsing free-text generated by LLM into structured outputs • Prevent prompt injection	Hands-on with notebook **Learning Outcome:** • Discover the major LLMs and aware of the difference in capabilities and performance • Understand and apply important parameters such as temperature and top-k • Understand and take advantage of how LLM handles chat and chat history

Week	Descr	Comment

3
 	
Starts on 12-AUG
	• **Use Case Archetypes #1: Building System with Advanced Prompting and Prompts Chaining**
	    • Keeping "chat history" with *ChatCompletion* API
	    • Prompting Techniques for better LLMs' reasoning
	    • Multi-action in a single prompt
	    • Chaining multiple prompts: Sequential Chain and Router Chain
	    • Quality and Safety
	        • Preventing prompt injections
	        • Moderation (detection of self-harm, unlawful, and racist contents)
		Hands-on with notebook
		
		Learning Outcome:
		• Learn and apply advanced prompting that is important instruction-based tasks
		
		• Learn to build multi-step LLM pipeline to complete complex tasks
		
		• Learn to evaluate LLM inputs and outputs for safety, accuracy, and relevance.

4
 	
Starts on 19-AUG
	• **Use Case Archetypes #2: from Embeddings to Applications**
	
	    • Understand and handle Embeddings
	
	    • Use Case #1: Retrieval-Augmented Generation (RAG)
	
	    • Use Case #2: Search & Retrieval Go Beyond Keywords
	
	    • Use Case #3: Using Embeddings in Predictive Analytics
		Hands-on with notebook
		
		Learning Outcome:
		• Learn the underlying mechanisms behind RAG and applying them beyond Q&A
		
		• Under the potential impacts of the mechanisms on the performance of the LLM solutions
		
		• Learn to build an LLM solution with ability take in proprietary data and info, with granular control on the how these data/info being used in the pipeline.

Please note that as this Training Programme is currently in the development phase,
the structure, syllabus, and contents of this slide deck are provisional and may be subject to change. Thank you for your understanding.
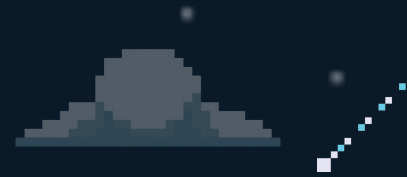
Details of Topics During Training Phase (cont.)

Week	Descr	Comment
5 **Starts on 26-AUG**	• **Use Case Archetypes #3: Chat with your Data – A Deeper Dive into RAG** 　　• Improving Pre-Retrieval Processes 　　• Improving Retrieval Processes 　　• Improving Post-Retrieval Process 　　• RAG Evaluation	Hands-on with notebook **Learning Outcome:** • Learn to build LLM solutions that can decide the appropriate tools for the given tasks. • Learn to build LLM solutions that can gather and use latest information from the Internet or other sources.
2-SEP to 8-SEP: Break Week	
6 **[Starts on 9-SEP**	• **Use Case Archetypes #4: LLM Agents with Tools** 　　• Agents and Multi-Agent System 　　• Tools and Function Calling • **Getting Familiar with Development Tools** 　　• Integrated Development Environment (IDE): VS Code - settings, plugins, terminals 　　• Python, pip, and venv • **Python for App Building** 　　• Writing & running a Python Script 　　• Exception handing and debugging	Hands-on with scripts (VS Code) **Learning Outcome:** • Learn to build a simple web application that serves the LLM pipelines to the users • Learn to build LLM solutions that can take in dynamic inputs from the users or existing data or files • [Project] Refine Project Proposal #1

Details of Topics During Training Phase (cont.)

Week	Descr	Comment

7
 	
[Starts on 16-SEP
	• **Building AI Apps (Part #1)**
	  • Understand Streamlit (and gotchas!)
	  • Basic input & outputs
	  • Linear execution
	  • Multi-page apps
	  • Launch Streamlit App on Local Machine
		Hands-on with scripts (VS Code)
		
		Learning Outcome:
		• Learn to build a web application that can handle more complex usage patterns (e.g., non-linear usage)
		
		[Project] Refine Project Proposal #2

8
 	
[Starts on 23-SEP
	• **Building AI Apps (Part #2)**
	  • Advanced concepts (e.g. state management, form, secret)
	  • Non-linear flow of execution (callback functions)
	  • Project Structure
	  • Deploy to Streamlit Cloud (password protection required to access app)
	
	• **Extra: Deploying App as Containerized Image** (Optional Components: non-assessable)
	
	  • What is containerization and how it works
	  • Containerize a Streamlit App
	    • Essential docker commands
	    • How to build and test a container on a local machine
	    • How to push the Docker image to image registers
		Hands-on with scripts (VS Code)
		
		Learning Outcome:
		• Learn to deploy a web-based app to allow others to access and use
		
		• Learn to package the LLM POCs/MVPs into containerized image that has great compatibility with various environments
		
		• Experience the deployment process on CStack which can be used by WOG officers without direct access to GCC

4 Weeks for Proof-of-Concept (PoC) Development

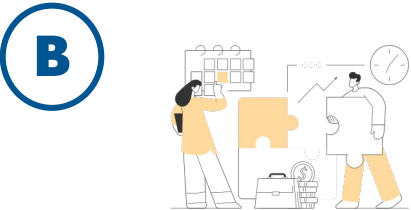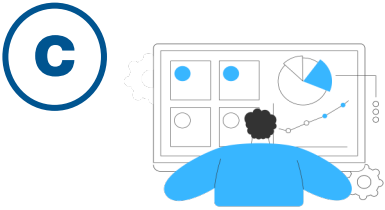| Week	Targets	Dates
POC Week 1	• Methodology, solution design, and mock-up	• Suggested: **30-SEP to 06-OCT**
POC Week 2	• Implementing the core processes as Python Script	• Suggested: **07-OCT to 13-OCT**
POC Week 3	• Implementing the PoC (with dynamic inputs)	• Suggested: **14-OCT to 20-OCT**
POC Week 4	• Implementing the PoC (with dynamic inputs)	• Suggested: **21-OCT to 27-OCT**
POC Submission	• Submission of PoC	• **Hard Deadline: 27-OCT 12:59 p.m.**

Showcase	• Demo session **for Selected PoCs**
	  • Selected individuals/teams will be informed in early October
	  • Project Sponsors & Stakeholders could be invited
		• Tentative: **28-OCT to 1-NOV**

• *The commitment from the participants are estimated to be 8 hours per week for development. The actual hours may vary based on the project.*

What Prototypes to Build?
Choose your path

Options	A Agency Project	B Idea @ *Launch Ideathon*	C Capstone Project
Description	Idea or problem statement from your agency or work area. Ideally this should be a use case that generally recognized by the agency/division and will bring practical value/benefits.	Pick an idea from Launchpad's "***Ideate***" page, be it "***LAUNCH! Ideathon 2024***" or your agency's ideathon on [Ideathon (launchpad.gov.sg)](launchpad.gov.sg)	A capstone project that requires you to apply learnt skills and technique to build a solution with a problem and the relevant content/data provided to you.
Members per Project	**1-3**	**1-3**	**1**
Other Perks	• Eligible to apply for PoC to be hosted on WOG platform during development. • A chance to be selected by their Agency or by bootcamp organising team to showcase PoC at a **WOG-wide event in Nov 2024.** Plus opportunities to be picked up by funding programmes!		• Project will be hosted on free public cloud

Notes:
- *Participants to **a) decide on their choice of their project and b) form their project teams, by week 4 of the training phase.***
- *Instructions on how to submit the project choice will be provided after the start of the Bootcamp*

Bring-Your-Own Key

- During the Bootcamp, participants will need to access OpenAI services.

- To help make the AI Champions Bootcamp **available to more officers at _No Cost (for now)_**, this program will adopt a **Bring-Your-Own API Key approach** when calling LLMs thru APIs. Participants will bear the cost of API usage when call LLMs.

- Estimated Costs for the APIs (to access OpenAI's model via code).
  - *During training phase:*
    - ***About USD $10***
    - OpenAI's gpt-3.5-turbo is sufficient for the hands-on tasks

  - *During project phase:*
    - Cost ***generally*** can range from ***USD $10 to $50***
    - Largely depends on the complexity of the proof-of-concept application
    - For more info on pricing, refer to https://openai.com/en-GB/api/pricing/

- Instructions on how participants will access/pay for the OpenAI will be available after onboarding to the learning management system (LMS).
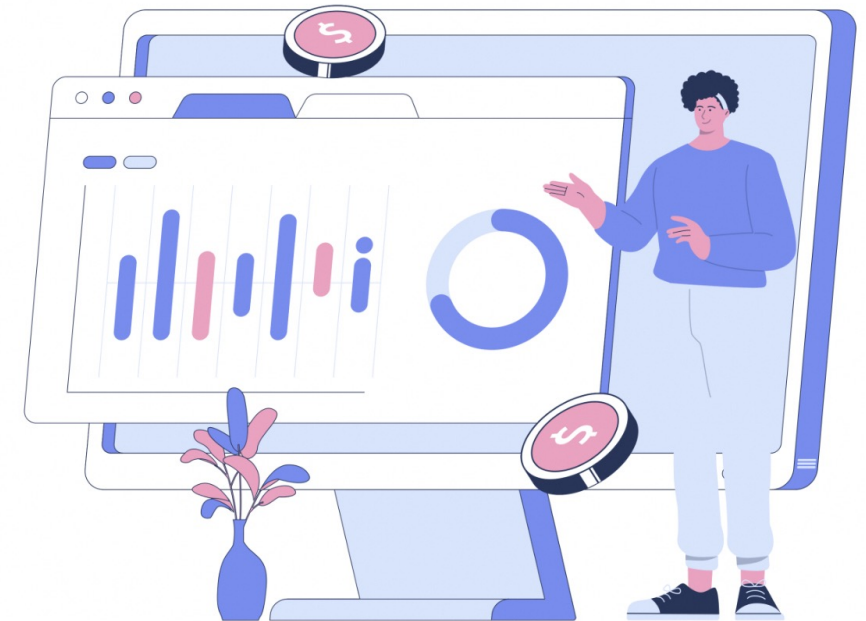
Note: There are other services that the participants will be introduced throughout the program. For those services, there are free-tier or free quota that is sufficient for the purpose of the training.

Hardware Required

- All participants <u>must</u> have a laptop that has:
  - **Full administrative rights**
    - To install software[1]

  - **Unrestricted access to the Internet**
    - Access to internet resources programmatically

  - This can be agency issued development or a personal laptop.
  <u>**No GSIB**</u> should be used for this bootcamp.

  - Windows, Linux, and MacOS (including Apple Silicones) can be used

[1]*Participants **do not have install specific software prior to the programme**.*
The required software will be gradually introduced throughout the duration of the programme.
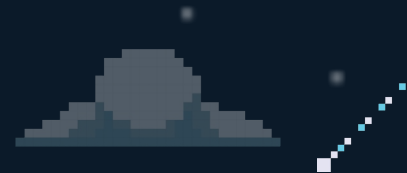
Learning and Community Support

- **Announcements**
- **Discussions on topics/materials**
- **Sharing of relevant ideas**

- **Weekly Online Q&A Sessions***

* The program may use other soft-as-a-service (SaaS) tools or platforms to facilitate info sharing or discussion and may rescheduled based on the participants' needs

Completion Requirements

Both Components must be met to complete the bootcamp and receive the digital certificate/badge*

| Components	Descriptions
Quizzes	✓ Pass all 3 quizzes at minimum 65% (passing mark)
Project	✓ Submit the project proposal, latest by 6th October# ✓ Submit the deployed Proof-of-Concept application

*Other requirements such as valid access to gov.sg email throughout the bootcamp applies
#Template for project proposal will be provided during the programme period.

Quizzes

- **3 quizzes**
  - End of Week 3 – (Materials from Week 1 to 3)
  - End of Week 6 – (Materials from Week 4 to 6)
  - End of Week 8 – (Materials from Week 7 & 8)

- **Multiple Choice Questions (MCQs)**
  - ~20 questions

- **Coverage:**
  - Content in the Course Notes
    - excluding content listed under "*Further Reading*", "*Bonus*", and "Extra"
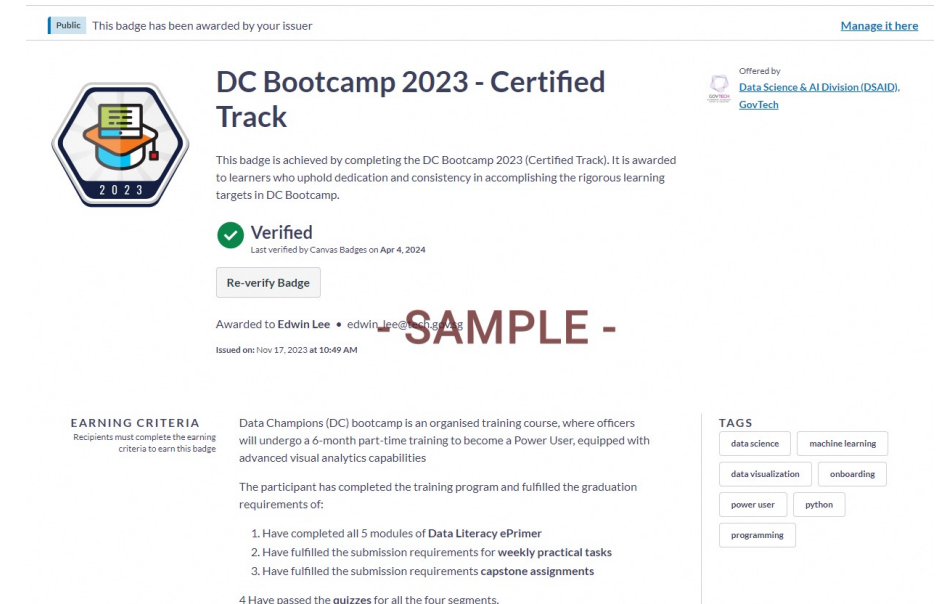 - Hands-on exercises (e.g. Jupyter Notebooks, Python scripts)
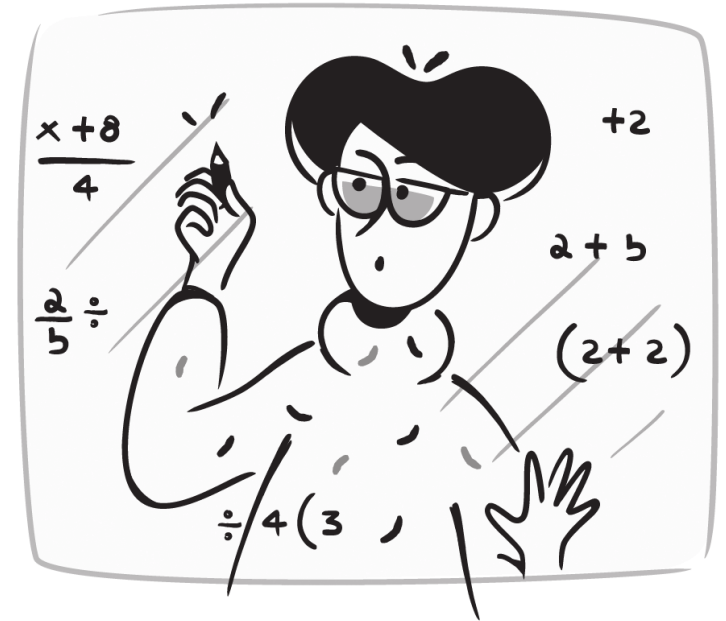
Certificate & Badge of Completion

After Completing AI Champions Bootcamp, eligible participants will get:

- **Digital Badge/Certificate**
  - Online digital badge unique to you
  - Easy sharing on social media
  - Easy verification of authenticity of achievement

Sample is based on DC Bootcamp 2023

Registration Form

Registration

- **Registration Closes:** 26th July 11:59pm

- After register, you will **receive emails with the instructions to onboard** to the Canvas learning management system (LMS) in **the second half of July 2024.**

- Meanwhile, please complete the **pre-reading** for the program:
  - GovTech's Prompt Engineering Playbook on **https://go.gov.sg/abc-preread**

GO.gov.sg

https://go.gov.sg/abc-register

Frequently Asked Questions (FAQs)

FAQs

1. Q: Do I have to pay to join AI Champions Bootcamp?

    Answer: There are no fees (for now) to join the bootcamp. As such, participants are required to pay for their own usage of the OpenAI APIs as participants will be using/calling OpenAI's models via code (see FAQ 14).

2. Q: Do I have to get the approval from my supervisor or agency to join the Bootcamp?

    Answer: GovTech <u>will not require</u> approvals from participant's supervisor or Agency to be accepted into the bootcamp. Do check with your agency HR on internal policies on participation in external events or training programs.

3. Q: Can I join the Bootcamp for self-directed learning and I do not need the cert?

    Answer: Yes, you can. You can register using the same registration form. You will be treated as a regular participant.

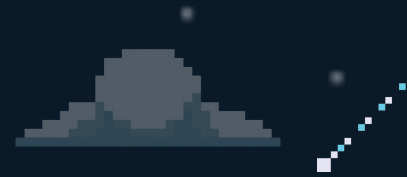**4. Q: Will my agency know that I participate in the program?**

    Answer: Yes. the list of participants and completion status will be shared/published, since many agencies may need the list for reporting purpose.

5. Q: Can temp staff or interns join the Bootcamp?

    Answer: All participants holding a valid *gov.sg* email, at the points of: a) registration AND b) completion, can join and complete the program to obtain the completion cert/badge. Completion badge/cert is tied to *gov.sg* email and will not be issued nor transferred to a personal email.

6. Q: Can public officers holding other email domains join the bootcamp?

    ▪ **Answer:** Yes, public officers such as those from polytechnics, MOM schools, and A*STAR are welcomed to join.

FAQs

7. Q: How can I get the completion certificate/badge?

    Answer: As long as the participant has access to a gov.sg email, at the points of: a) registration AND b) completion, they can join and complete the program to obtain the completion cert/badge. Completion badge/cert is tied to gov.sg email and will not be issued/transferred to personal email.

8. Q: What are the hardware specifications needed for the laptop/desktop?

    Answer: A regular laptop or desktop that can perform reasonably well for day-to-day work (e.g. multi-tasking with MS Teams, heavy PowerPoint slides, and web browsing) will do. Bootcampers will not expect run heavy computations on their device. No tablets/Ipad as those devices are unable to install the required software.

9. Q: I cannot get a laptop with full administrator right and unrestricted Internet access by the start of training. What can I do?

    ▪ **Answer:** You should get the laptop as soon as possible. As the last resort, you can use any laptop that can access Internet and allows you to access Google Colab for the first half of the training phase. Even so, this is not recommended as Google Colab can be very buggy especially on GSIB. You should get the required device before the first half of the training phase ends (i.e. week 4). There will be no extensions/exceptions to completion/graduation due to lack of device access/availability.

10. Q: I have a premium subscription for ChatGPT Plus. Do I still need to pay to use OpenAI APIs?

    ▪ **Answer:** Yes, you will still need to pay to use the OpenAI APIs. The premium subscription covers the cost for ChatGPT Plus service only. Additional charges will apply when calling OpenAI APIs as they are considered separate services provided by OpenAI.

11. Q: Can I use any other LLMs than the suggested OpenAI APIs?

- **Answer:** We <u>do not</u> recommend this and only if they are confident to do so. The training requires use of LLMs and embedding model(s) that are compatible with <u>OpenAI's Python SDK</u>. You are expected to diagnose and resolve the technical issues that may arise due to the use of other APIs or LLMs.

12. Q: What are the considerations for agency's projects / problem statements that my Proof-of-Concept Prototype will be based on?

- **Answer:** This largely depends on the classification of the app/data used due to the API services and hosting platform(s), which should be only up to "Official (Closed)/Non-Sensitive". This can be achieved by using dummy/synthetic data for purpose of building the prototype.

13. Q: Do we have to submit assignments and conduct peer-review, like in Data Champions Bootcamp?

- **Answer:** No. There will not be weekly assignment submissions and thus no peer-reviews. Participants are required to pass all the three quizzes (65% correct answers to pass) <u>and</u> submit their Proof-of-Concept Prototypes by the stipulated deadline. See the slide on *completion requirements.*

14. Q: What are topics that will not be covered?

- **Answer:** As an intermediate-tier training program, AI Champions Bootcamp focus on applying LLMs to achieve practical outputs, allowing the officers to quickly experiment with their ideas. The program will not cover topics, as such as architecture of LLMs and transformer models, LLM fine-tuning, or adaptation of Language Models.

FAQs

15. Q: Will there be instructions on how we can subscribe, pay, monitor and limit usage on OpenAPI APIs?

- Answer: Yes. Instructions on how participants will access/pay for the OpenAI will be available after onboarding to the learning management system (LMS).

16. Q: Will I be able to claim for the cost of API usage?

- Answer: Do check with your Agency HR on claims. GovTech will not reimburse any costs that you incur from joining the bootcamp.

17. Q: How will I know if my Agency is coordinating for use-cases or demo day?

- Answer: We will share this info only after registration closes so that we can reach out to selected Agencies.

18. Q: What happens if I have to go on holiday or official duties during the bootcamp?

- Answer: This programme is catered for self-directed adult learners, so participants are expected to manage their time to complete the quizzes/submissions. We've also made the workshops attendance optional to offer flexibility. Deadlines for quizzes and submissions will also be provided in advance to help you plan your time.

19. Q: If I choose to work on my agency use-case for PoC, do I need to seek agency or GovTech approval?

- Answer: There is no need to seek GovTech approval for agency use-cases but you should check with your supervisor if they can be used for the bootcamp.

20: Q: If I don't complete the bootcamp, can I continue where I left off next year and get the completion badge?

- Answer: Nope. The bootcamp content will refresh every year and the technology moves rapidly.