ABC5-Lab

Course Overviews &
Course Syllabuses

Content

Course Overviews

Course Syllabuses

Course Overview

Future-proof your students
Learning cutting-edge technologies such as AI and blockchain is essential for today's secondary students. As we are at the beginning of the 4th industrial revolution or the 2nd part of the digital revolution, both AI and blockchain will reshuffle the socio-economic order across the world.

Getting exposure to these technologies as soon as possible will yield a competitive advantage for the students in the future. With our training, which is tailored for secondary level learners, the students will be kept up to date with relevant and practical skills and know-how.

Learn applicable skills in real-life environments
ABC5-Lab consists of two parts – firstly, there's an enterprise grade lab, which is offered at a fraction of the price of similar labs. This virtual lab enables the students to create AI or blockchain applications and prototypes, and has a complete development environment, which includes blockchain platforms such as, Algorand, R3 Corda, and Hyperledger Fabric, and two programming languages, Python and Julia.

The second part consists of the accompanying programmes which teach AI and blockchain, from basic to advanced levels. Additional learning materials are also available, which consist of self-paced lessons, and coding exercises.

Course Overview

Outcomes

The learning outcome is to build on existing concepts already covered in the EDB curriculum and build up familiarity with the basic principles of AI and blockchain through:

- Demonstrating understanding by a solution proposal to a challenge of their choice
- Learning how to properly present difficult concepts and how their creations work
- Tackling challenges that exist in the real world

By learning in context with a challenge of their choice, students develop deeper ownership and interest in AI and blockchain to better identify and fill gaps in their understanding from an entry-level perspective. By presenting real-life applications, the students can appreciate what they learn and also gain a career-oriented mindset before their peers.

Objectives with Basic Training for Blockchain and/or Machine Learning

- Enable students to keep abreast of new technologies
- Broaden students' exposure to the IT industry and career opportunities
- Enhance students' ability to apply the IT knowledge and skills learned
- Foster students' innovative abilities
- Enrich students' learning experience e.g. competitions, visits, projectlearning, etc.

Role of school in the delivery

- Actively encouraging student participation in asynchronous and live lessons & events
- Supervising students to meet internal and external deadlines for competitions
- Liaising between students and instructors for optimal learning experiences

Basic Training for AI:
Machine Learning & Data Science

This introductory training programme teaches what machine learning (ML) is in the simplest terms, how ML is used now and in the future, and why ML knowledge is crucial for a good career in the 2020s. This programme develops the student's ability to think innovatively in regards to ML, and will grant a certificate upon course completion.

As today's IT technology is getting increasingly sophisticated, an important type of AI called machine learning (ML) will reshuffle the socio-economic order across the world. While a plethora of programmes teach how to use AI applications or operate AI-enabled equipment, we teach students the fundamentals of ML such that they can understand or design AI systems from scratch.

No prior skills or knowledge are needed to enroll in this course. This programme is designed for mass consumption, so ideally, all students of the entire school may participate.

Scope

This programme teaches:

- What ML is in the simplest terms
- How ML is used now and in the future
- Why secondary students should be acquainted with ML i.e. why ML knowledge is crucial for a good career in the 2020s

List of Activities & Engagement for AI: Machine Learning & Data Science

The programme is held over 5 to 10 weeks, unaffected by the pandemic

- Includes interactive games, case studies, short quizzes to gauge and engage continuously
- Each week's modules may be accessed asynchronously online, with live tutorials on the weekend and live ideation
- Duration: a total of 6 to 9 hours to complete, excluding tutorials and ideation
  - ° Modules may be accessed asynchronously online (between 1 to 2 hours each)
- Live tutorials: students can ask about anything (up to 3 hours)
  - ° Students may switch between different topics, such as fintech, healthtech, regtech, etc.
  - ° Limited attendance in-person, rest in teleconference breakout rooms

Students demonstrate their understanding by completing a capstone project

- Students first pick a challenge/problem as a theme to accompany them on their learning journey
- Students propose a data science application for a real-world challenge of their choice
- Twice a week, ideation sessions are moderated by academic & industry mentors to assist students with their capstone projects at every stage of the process (up to 2 hours each)

Students may optionally build part of their proposed application or the whole with Lab tools

- Includes proprietary trust and privacy toolkits to deploy real-world applications
- Includes example applications for demonstrating the concepts of machine learning
- Includes machine learning architecture environments for prototyping applications (no coding)
- Includes coding exercises and developer environments in Python and Julia

Springboard to advanced training

Students who have finished our basic training course will be encouraged to participate in the “Competitions Preparation Training for ABCD Competitions” programme, which will primarily prepare students for:

- Breakthrough Junior Challenge
- (Hong Kong & International) Data Science Olympiad
- The Ladies of Lovelace Awards
- The Ross Programme
- Trust Tech as the New Frontier

This capstone project may manifest itself in the following forms:

- Poster Board
- Pitch Videos
- Prototypes

Basic Training for Blockchain

This introductory training programme teaches what blockchain is in the simplest terms, how blockchain is used now and in the future, and why blockchain knowledge is crucial for a good career in the 2020s.
This programme develops the student's ability to think innovatively in regards to blockchain, and will grant a certificate upon course completion.

No prior skills or knowledge are needed to enroll in this course. This programme is designed for all secondary students, so ideally, all students of the entire school may participate.

Background
Ask any student today if they can imagine a world without the internet — most cannot. After a period of unbounded euphoria (the 1990s) followed by a period of mature growth (the 2000s), the internet has become a vital part of the socio-economic fabric globally. Blockchain technology is today where the internet was in the late 1990s or early 2000s, but with more enterprise and government interest and applications. Students with a better understanding of blockchain have a decisive advantage over their peers when they graduate. With the bitcoin and cryptocurrency markets entering another phase of euphoria, it is even more important to provide proper blockchain education to students, so that they can better discern what works and what does not.

Scope
This programme teaches:
- What blockchain is in the simplest terms
- How blockchain is used now and in the future
- Why secondary students should be acquainted with blockchain i.e. why blockchain knowledge crucial for a good career in the 2020s

List of Activities & Engagement for Basic Training for Blockchain

The programme is held over 5 to 10 weeks, unaffected by the pandemic

- Includes interactive games, case studies, short quizzes to gauge and engage continuously
- Each week's modules may be accessed asynchronously online, with live tutorials on the weekend and live ideation
- Duration: a total of 6 to 9 hours to complete, excluding tutorials and ideation
  - ° Modules may be accessed asynchronously online (between 1 to 2 hours each)
- Live tutorials: students can ask about anything (up to 3 hours)
  - ° Students may switch between different topics, such as fintech, healthtech, regtech, etc.
  - ° Limited attendance in-person, rest in teleconference breakout rooms

Students demonstrate their understanding by completing a capstone project

- Students first pick a challenge/problem as a theme to accompany them on their learning journey
- Students propose a data science application for a real-world challenge of their choice
- Twice a week, ideation sessions are moderated by academic & industry mentors to assist students with their capstone projects at every stage of the process (up to 2 hours each)

Students may optionally build part of their proposed application or the whole with Lab tools

- Includes proprietary trust and privacy toolkits to deploy real-world applications
- Includes example applications for demonstrating the concepts of blockchain
- Includes blockchain architecture environments for prototyping applications (no coding)
- Includes coding exercises and developer environments in Algorand, Corda, and Hyperledger Fabric

Springboard to advanced training

Students who have finished our basic training course will be encouraged to participate in the “Competitions Preparation Training for ABCD Competitions” programme, which will primarily prepare students for:

- Breakthrough Junior Challenge
- (Hong Kong & International) Blockchain Olympiad
- MIT Algorand
- The Ladies of Lovelace Awards
- The Ross Programme
- Trust Tech as the New Frontier

This capstone project may manifest itself in the following forms:

- Poster Board
- Pitch Videos
- Prototypes

Competition Preparation Training

This programme prepares students for a plethora of competitions, notably the Int'l Blockchain Olympiad (IBCOL) and Int'l Data Science Olympiad (IDSOL), by improving their existing capstone projects from basic training. This programme includes self-paced classes, live mentoring, and on-demand mentoring.
The programme coaches students on writing, pitching, posters, and handling Q&A and interactions.

Scope
The scope of this programme is to prepare secondary school students for expertise-testing competitions, specifically those in the area of ABCD: AI (focus on machine learning), blockchain (focus on enterprise applications), cryptography, data science, and related STEM subjects. The objective is to simulate a professional environment in which they present their projects.

The prerequisite for this programme is either the «Blockchain Lab with Basic Training for Blockchain» or the «AI & Data Science Lab with Basic Training for Machine Learning» programme — because the outcome and overall theme of those programmes are capstone projects in machine learning or blockchain or both. These projects form the basis for the Competition Preparation Training programme, which helps students improve their project to be globally competitive.

List of Activities & Engagement for Competition Preparation Training

The programme is held over 5 to 10 weeks, unaffected by the pandemic

- Self-paced classes: recommended completion date before 1 May 2021
- Twice-a-week mentoring for ABCD projects and case studies (up to 4h)
- On-demand mentoring for ABCD projects and case studies (up to 12h)
- Each weekend has optional tutorials to let students ask about anything
- Presentation workshops: writing, pitching, posters, press conferences (3-6h)

Main Objectives with Competition Preparation Training

- Creativity and innovation
- Communication skills
- Presentation abilities
- Collaboration skills
- Cross-disciplinary skills

A bad project with a good presentation fails eventually…
A good project with a bad presentation fails immediately!

The learning outcome is to teach and train students to be good presenters across a variety of media commonly used in academic and corporate settings, such as white papers and reports, poster boards and large contiguous displays, and pitch presentations with and without slide decks of various lengths. We also teach students how to handle questions and lead discussions.

This training not only deepens students' understanding and application of AI and blockchain, it also prepares students for our optional competitions IBCOL and IDSOL.

Competitions and demo days

At the end of the season, students showcase their capstone projects at the demo days and/or competitions.

Basic course:

- Students will showcase their project on a poster board at the end of the course
- Students can choose to present their project in our ABCD-competition, by delivering a five minute presentation along with their poster board.
- Students compete for districts- and Hong Kong-wide championship awards

Competition course:

- Students will showcase their project on a poster board, white paper, and pitch presentation
- Students can choose to present their project in our competitions “Hong Kong Data Science Olympiad” (HKDSOL), and/or “Hong Kong Blockchain Olympiad” (HKBCOL)
- Secondary- and tertiary-level students across HK compete for prizes
- Secondary-level students are evaluated based on HK-ABCD results (revisions due May 28)
- Winning teams represent Hong Kong in the international competitions “International Data Science Olympiad” (IDSOL), and “International Blockchain Olympiad” (IBCOL)

Competitions and demo days Schedule

Schedule for 2020-2021 Season
CDD (4-18 May 2021)
HK-ABCD (22-23 May 2021)
HKDSOL, HKBCOL (19 June 2021)
IDSOL, IBCOL (2-4 July 2021)

Schedule for 2021-2022 Season
CDD (2-16 May 2022)
HK-ABCD (21-22 May 2022)
HKDSOL, HKBCOL (18 June 2022)
IDSOL, IBCOL (8-10 July 2022)

Schedule for 2022-2023 Season
CDD (1-15 May 2023)
HK-ABCD (20-21 May 2023)
HKDSOL, HKBCOL (17 June 2023)
IDSOL, IBCOL (7-9 July 2023)

Intra/inter-school competitions & demo days (CDD)
All Hong Kong ABCD Competition and Exhibition (HK-ABCD)
Hong Kong Blockchain Olympiad (HKBCOL)
International Blockchain Olympiad (IBCOL)
Hong Kong Data Science Olympiad (HKDSOL)
International Data Science Olympiad (IDSOL)

AI & Data Science Track

1 What is AI & Data science

Motivations of AI & Data Science

- History and the Future
- Choose Your Challenge or Problem Area

AI Introduction & Data science introduction

- What is AI & Data science
- The relationship between AI & Data science
- Turing Test

Basic concept of AI

2 Searching

Tree Search

- Algorithm - uninformed search: Breadth-first search & Depth-first search, Uniform-cost search
- Algorithm - Informed search: Greedy best-first search, A* Search
- Example: N-queen problem

Game Tree

- Local Search

AI & Data Science Track

3 Clustering & Classification

Data Preprocessing

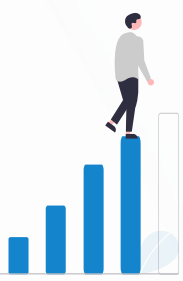
Concept of learning

- Supervised learning
- Unsupervised learning

Classification

- Decision tree based algorithms
- Bayesian approach
- Statistical approaches
- Nearest neighbour approach

Clustering



4 Neural Network

Concept of Neural Network

- Neuron v.s. Artificial Neuron
- Regression

Multi-Layer Perceptron

Performance on different non linearly separable problems

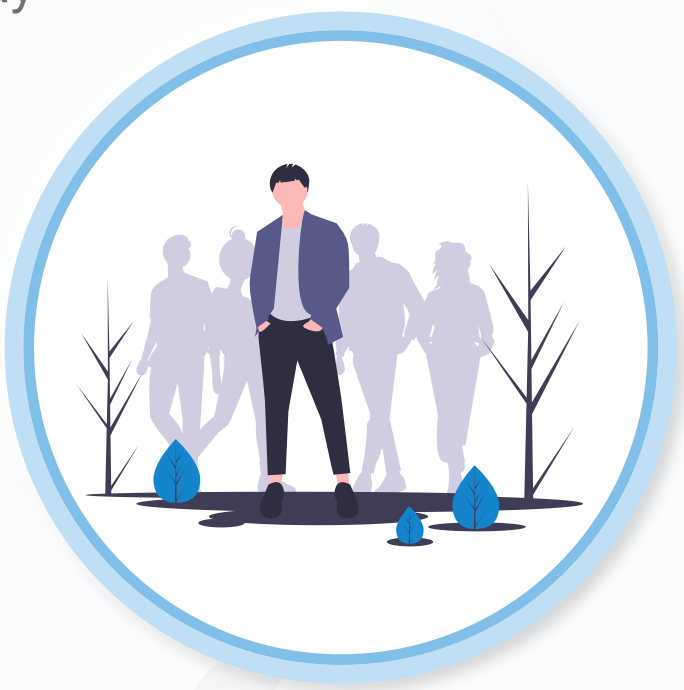
AI & Data Science Track

5 Application and Use case

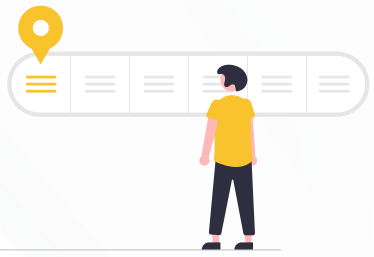
- Chatbot
- AlphaGo
- Other business applications

6 Capstone Project

- Refine Your Chosen Challenge
- State Your Solution
- Creating a Poster Display
- Presenting a Poster Display



Blockchain Track



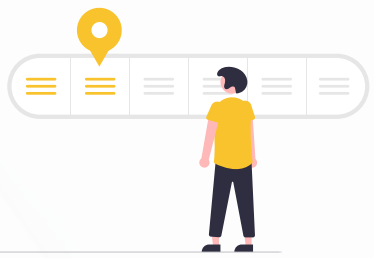
1 What is blockchain?

Blockchain Introduction

- Chain Analogy + Magic Ledger
- Internet of Information to Internet of Value
- Double Spending Problem

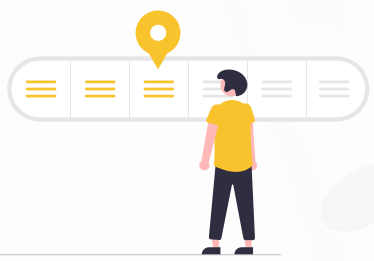
Why blockchain matters?

- Real world problems
- Choose Your Challenge or Problem Area
- Blockchain platforms



2 Blockchain Business & Opportunities

- Public Chain v.s. Private Chain
- Enterprise blockchain



3 How does blockchain work?

Centralised System & Decentralised System

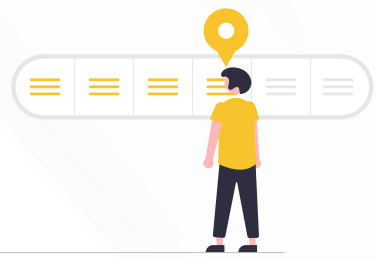
Cryptography

- Caesar Cipher
- Hash & Hash Trees

Identity 7 Privacy

- Identity Theft & Data Breaches

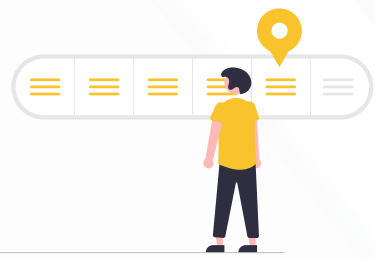
Blockchain Track



4

Enterprise Blockchain

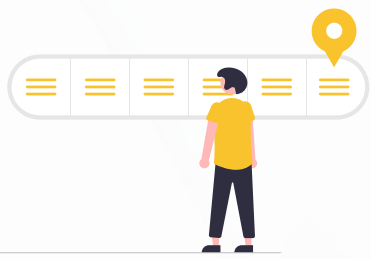
- Asset Tokenisation & Digital Fiat



5

Application & Use Case

- Immunodex
- Aero-Knowledge Proof



6

Application & Use Case

- Refine Your Chosen Challenge
- State Your Solution
- Creating a Poster Display
- Presenting a Poster Display

Competition Prep Course

1

Writing Workshop (1 or 2 hours)

- Writing Styles
- What to (not) write
- Planning a paper
- How to use appendices
- How to use reference and reference styles
- Formatting best practices and style guides

2

Pitching Workshop (1, 1½, or 2 hours)

- 1- or 2-min Elevator Pitch
- 3- or 5-min Deck-Assisted Pitch
- 10- or 15-min Deck-Assisted Pitch
- Planning a pitch deck
- Formatting a pitch deck

3

Posters & Press Workshop (1, 1½, or 2 hours)

- How to layout a poster
- How to engage a conversation
- How to ask good questions