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**Presidential Initiative for Artificial Intelligence and Computing (PIAIC)**

https://www.piaic.org

**Blockchain Specialist Program**

Course Syllabus

**Quarter I: BC-301 Blockchain Business Foundations**

Version 1.0.0 - 2020 (12 Weeks)

**Teaching Team: Zeeshan Hanif, Qasim Shabbir Ferozpurwala, Muhammad Hammad Ahmed, Umair Munaf Moon, Muhammad Mudassir Khan, Mirza Fasihullah Baig, Muhammad Ali Raja, Yousuf Hanif, Aaly Malik, Jawad Ahmed, and Ahmad Manzoor**

**Course Description: Many experts are predicting that blockchain will take over the world, and it will have a bigger impact on the world than the Internet. World wide over two billion people don’t have access to financial services. They are outside the normal financial system and are considered unbanked people of this world. Most of these people live in the emerging countries like Pakistan. These unbanked don’t have direct access to deposit accounts, credits, money transfers or insurance. Financial inclusion driven by blockchain, decentralized apps, and fintech will transform their lives by bring them out of poverty and helping them improve their lives. In the first quarter of this program we will cover general blockchain knowledge, why use blockchain, how blockchain works, and using the blockchain for business and financial inclusion. This course will prepare the student for the Pearson VUE Certified Blockchain Business Foundations Exam (CBBF).**

**Please bring a Laptop with you for the Classes (Required, but not mandatory)**

**Preparation for the Pearson VUE Certified Business Foundations (CBBF) exam:**

[Pearson VUE Certified Business Foundations (CBBF) exam](https://blockchaintrainingalliance.com/products/cbbf)

**Textbooks:**

1. [CBBF Official Exam Study Guide](https://blockchaintrainingalliance.com/collections/blockchain-exam-prep-guides/products/cbbf-official-exam-study-guide)
2. [Mastering Bitcoin 2nd Edition - Programming the Open Blockchain by Andreas M. Antonopoulos](https://github.com/bitcoinbook/bitcoinbook)
3. [Mastering Ethereum: Building Smart Contracts and DApps by Andreas M. Antonopoulos, Gavin Wood](https://github.com/ethereumbook/ethereumbook)
4. [Building Ethereum Đapps: Decentralized Applications on the Ethereum Blockchain by Roberto Infante](https://www.manning.com/books/building-ethereum-dapps)
5. [Learn Version Control with Git: A step-by-step course for the complete beginner by Tobias Günther](https://www.amazon.com/Learn-Version-Control-step-step-ebook/dp/B00K54OL8I/ref=sr_1_3)

**PIAIC Announcements Facebook Group:** <https://www.facebook.com/groups/piaic/>

**Course Facebook Group:** <https://www.facebook.com/groups/cryptowitai.blockchain/>

**Portal for online and onsite students:**

<https://portal.piaic.org/>

**Chat on Telegram:**

Group Name: PIAIC-BC

https://t.me/piaic\_bc

**Grading:**

Students will be graded based on Percentile

<https://en.wikipedia.org/wiki/Percentile>

<https://en.wikipedia.org/wiki/Percentile_rank>

A-Grade: 78- 99 Percentile

B-Grade: 41- 77 Percentile

C-Grade: 23- 40 Percentile

D-Grade: 1 - 22 Percentile

F-Grade: Anyone who doesn’t appear in two or more exams

Note: Anyone who receives a F-Grade will be removed from the program. Students who receive a D-Grade will be put on probation, and be required to earn a grade of C or above in the next quarter, to remain in the program. Anyone absent from an exam will be deemed to have received a score of zero.

**Important Note:**

If a PIAIC candidate doesn’t appear in a Quiz at the scheduled time announced by management 10% score will be deducted from the test score for every week of delay.

**Course Outline:**

1. **Fundamentals of Blockchain** (Week 1 to 5)

Introduction:

<https://www.facebook.com/confidencenyirenda/videos/506908552980833/>

Demos:

<https://anders.com/blockchain/>

<https://anders.com/blockchain/blockchain.html>

<http://cobweb.cs.uga.edu/~dme/csci6300/Encryption/Crypto.html>

Chapters 1, 2, 3, 4, 5, 6, 7, and 8 from CBBF Official Exam Study Guide

First two chapter of Mastering Bitcoin: Programming the Open Blockchain 2nd Edition

Public and private keys:

<https://bitzuma.com/posts/six-things-bitcoin-users-should-know-about-private-keys/>

<https://bitcoin.stackexchange.com/questions/43546/does-the-private-key-of-bitcoin-change-everytime-the-address-changes>

Hashing:

<https://www.webopedia.com/TERM/H/hashing.html>

Merkle Tree

<https://coincentral.com/merkle-tree-hashing-blockchain/>

Proof of work:

<https://keepingstock.net/explaining-blockchain-how-proof-of-work-enables-trustless-consensus-2abed27f0845>

Other Consensus Algorithms

<https://101blockchains.com/consensus-algorithms-blockchain/>

What is Double Spending & How Does Bitcoin Handle It?

<https://coinsutra.com/bitcoin-double-spending/>

Transactions:

<https://www.coindesk.com/information/how-do-bitcoin-transactions-work/>

How Blocks are created?

<https://dev.to/damcosset/blockchain-what-is-in-a-block-48jo>

<https://bitcoin.stackexchange.com/questions/8172/what-happens-if-two-miners-mine-the-next-block-at-the-same-time/8174>

**Bitcoin and Blockchain Quiz 1 in Week 6:**

Total Questions: 51, Total Time: 60 minutes

1. **Additional and Supplementary Material: Fundamentals of Version Control with Git**

(**Videos and reading material available on Student Portal to help students learn Git, this material will not be covered in class to save class time)**  
Chapters 1, 2, 3, and 4 Learn Version Control with Git: A step-by-step course for the complete beginner by Tobias Günther

We will also covers these readings:

<https://help.github.com/articles/markdown-basics/>

<http://stackoverflow.com/questions/5009600/difference-between-fork-and-branch-on-github>

<http://stackoverflow.com/questions/3329943/git-branch-fork-fetch-merge-rebase-and-clone-what-are-the-differences>

<https://git-scm.com/book/en/v2/Git-Branching-Rebasing>

<http://git-scm.com/book/en/v2/Git-Branching-Remote-Branches#Tracking-Branches>

For practice: <https://try.github.io/levels/1/challenges/1>

Homework:

<https://www.datacamp.com/courses/introduction-to-git-for-data-science>

**Git Quiz in Week 1 of Quarter 2**

Total Questions: 60, Total Time: 75 minutes

*Note: Git study material and videos are being made available in the first quarter so that students are able to use Git immediately. The Git Quiz will be conducted in the first week of the next quarter i.e. second quarter and not in this first quarter.*

1. **Blockchain 2.0 and Ethereum Part 1** (Week 6 and 7)

Chapters 9 and 10 from CBBF Official Exam Study Guide

What is Ethereum?

<https://github.com/ethereumbook/ethereumbook/blob/develop/01what-is.asciidoc>

Introduction

<https://github.com/ethereumbook/ethereumbook/blob/develop/02intro.asciidoc>

Object-Oriented Programming: Objects, Classes & Methods

<https://study.com/academy/lesson/oop-object-oriented-programming-objects-classes-interfaces.html>

What's the difference between a solidity contract and an OOP class?

<https://ethereum.stackexchange.com/questions/23789/whats-the-difference-between-a-solidity-contract-and-an-oop-class>

1. **Blockchain 2.0 and Ethereum Part 2** (Week 8 and 9)

Ethereum Client (Parity not covered)

<https://github.com/ethereumbook/ethereumbook/blob/develop/03clients.asciidoc>

Ethereum Testnets

<https://medium.com/compound-finance/the-beginners-guide-to-using-an-ethereum-test-network-95bbbc85fc1d>

Keys and Addresses (Just study the Introduction)

<https://github.com/ethereumbook/ethereumbook/blob/develop/04keys-addresses.asciidoc>

Wallets (only up to Wallet Best Practices)

<https://github.com/ethereumbook/ethereumbook/blob/develop/05wallets.asciidoc>

Transactions (Digital signatures section not included)

<https://github.com/ethereumbook/ethereumbook/blob/develop/06transactions.asciidoc>

**Ethereum and Blockchain Quiz 2 in Week 10:**

Total Questions: 60, Total Time: 60 minutes

1. **Blockchain 2.0 and Ethereum Part 3** (Week 10)

What is a Smart Contracts (till Building a smart contract with Solidity):

<https://github.com/ethereumbook/ethereumbook/blob/develop/07smart-contracts-solidity.asciidoc#what-is-a-smart-contract>

Why Many Smart Contract Use Cases Are Simply Impossible

<https://www.coindesk.com/three-smart-contract-misconceptions/>

Deploying Smart Contracts

<https://github.com/ethereumbook/ethereumbook/blob/develop/07smart-contracts-solidity.asciidoc>

What are tokens?

How are tokens used?

Tokens and fungibility

Counterparty Risk

Tokens and intrinsicality

Using tokens: utility or equity

Token Standards (Just the very basics and a little bit of ERC20)

<https://github.com/ethereumbook/ethereumbook/blob/develop/10tokens.asciidoc>

Special Emphasis on Gas

1. **Private Blockchain Technologies**  (Week 11)

An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends

<https://www.researchgate.net/publication/318131748_An_Overview_of_Blockchain_Technology_Architecture_Consensus_and_Future_Trends>

A gentle introduction to The Hyperledger Project

<https://bitsonblocks.net/2016/12/09/a-gentle-introduction-to-the-hyperledger-project/>

Hyperledger

<https://en.wikipedia.org/wiki/Hyperledger>

What’s the Difference Between the 5 Hyperledger Blockchain Projects?

<https://www.sdxcentral.com/articles/news/whats-the-difference-between-the-5-hyperledger-blockchain-projects/2017/09/>

The top 5 enterprise blockchain platforms you need to know about

<https://www.horsesforsources.com/top-5-blockchain-platforms_031618>

<https://blockgeeks.com/guides/different-smart-contract-platforms/>

1. **Blockchain Use Cases and Verticals** (Week 12)

Chapters 11 and 12 from CBBF Official Exam Study Guide

Chapter 2 Summary, Chapter 3 from Building Ethereum ĐApps

Additional Reading:

Chapters 13 and 14 from CBBF Official Exam Study Guide

**Blockchain Quiz 3 in Week 12:**

Total Questions: 60, Total Time: 60 minutes