# 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 2.0.0 - 2022 (12 Weeks)

**Teaching Team:** Zeeshan Hanif, Qasim Shabbir Ferozpurwala, Umair Munaf Moon, Yousuf Hanif,

**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

**Textbooks:**

1. CBBF Official Exam Study Guide
2. Mastering Bitcoin 2nd Edition - Programming the Open Blockchain by Andreas M. Antonopoulos
3. Mastering Ethereum: Building Smart Contracts and DApps by Andreas M. Antonopoulos, Gavin Wood
4. Learn Version Control with Git: A step-by-step course for the complete beginner by Tobias Günther

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

**Portal for online and onsite students:**
https://portal.piaic.org/

**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.youtube.com/watch?v=u2t4G9pAb2g

   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

2. **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.*

3. **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

4. **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

5. **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

6. **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/

7. **Blockchain Use Cases and Verticals** (Week 12)
   Chapters 11 and 12 from CBBF Official Exam Study Guide

   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