NODE NATION

CURRICULUM 2025

Finance • Philosophy • Technology

insert your country here!

>_ OBJECTIVE

Awaken students' curiosity and guide them on an exciting journey of discovery into the world of Bitcoin. Through interactive games and hands-on projects with open-source software, they will learn the fundamentals of this technology, fostering their creativity and critical thinking.

Furthermore, they will develop the necessary skills to become future leaders who will build a more just and equitable world, where Bitcoin plays a key role as the global money of the future.

>_ PRESENTATION

THE KIDS DESERVE FUN WHILE LEARNING BITCOIN!

Through fun games and hands-on projects, you will discover how Bitcoin works, from its origins to its most advanced applications, with the support of open-source resources, culminating in the installation of a Bitcoin node.
In our course, divided into 7 blocks, we will explore a new aspect of Bitcoin each week for 4 hours.

DURATION: 7 WEEKS
LEVEL: BASIC - INTERMEDIATE

>_ GENESIS BLOCK

"A good that is assigned the role of a widely accepted medium of exchange is called money."

Saifedean Ammous / The Bitcoin Standard

- **Block Objectives**
  - Let's become money detectives! We will explore the history of money and discover how it has evolved from bartering to the coins and bills we use today.
  - Let's uncover the mysteries of inflation! We'll conduct fun experiments to understand how excessive money creation can affect prices, our savings, and the economy as a whole.

DURATION: 4 HOURS
LEVEL: BASIC

- **Block Development**
  - Function of Money **(BG-DA)**
    - Store of Value
    - Medium of Exchange
    - Unit of Account
  - Properties of Money **(BG-DB)**
    - Portability
    - Divisibility
    - Durability
    - Fungibility
    - Scarcity
    - Acceptibility
  - Why should I care about Money? **(BG-DC)**
    - Dilution
    - Inflation / Deflation
    - Purchasing Power
    - Central Banks
    - Cantillon Effect
  - There is hope, and it’s orange!
    - Bitcoin solves all the problems of today’s money

- **Practical Activities**
  - Video “Broken Money” (Spanish subtitiles) / Lyn Alden
    - The financial system is broken.
      - Barter Activity
  - Drink Dilution Game
    - Understand money dilution
      - Drink Dilution Activity
  - Barter Game
    - Understand the difficulty of finding a coincidence of wants.
  - Video of Sound Food
    - How inflation affects our food and thus lowers our quality of life.

The failure of money impacts everything we do and everything we are

- an anonymous French person -

>_ BLOCK ONE

Therefore, privacy in an open society requires anonymous transaction systems.. An anonymous system allows individuals to reveal their identity when they choose and only when they choose; this is the essence of privacy.

- Eric Hughes / Cyperpunk Manifesto -

- **Block Objectives** (I)
  - Unveil the secrets of the cypherpunks and how they fought for a more private and secure world, and how their ideas gave rise to Bitcoin!
  - Learn how to generate and use a Bitcoin key pair to sign and verify messages.

- **Block Objectives** (II)
  - Explore the technologies underlying Bitcoin, such as asymmetric cryptography.
  - Protect your Bitcoin with hrdware by discovering how hardware wallets ensure the security of your funds by securely storing your private keys.

DURATION: 4 HOURS
LEVEL: INTERMEDIATE (IT IS NECESSARY TO KNOW THE ANSWER TO “WHAT IS MONEY?”)

- **Block Development**
  - CypherPunk Manifesto **(B01-CPA)**
    - Privacy matters
  - Technology that inspired Bitcoin **(B01-CPB)**
    - Some Bitcoin predecessors
      - Nick Szabo | BitGold
      - Wei Dai | B-Money
      - Adam Back | Hashcash
      - Halfiney | Reusable Proof of Work
    - Technology Preceding Bitcoin
      - Phil Zimmerman | PGP
      - Brahm Cohen | Bittorrent
  - Elliptic Curve **(B01-CPC)**
    - Symmetric Cryptography
    - Asymmetric Cryptography (Public Key)
    - Secp256k1
  - Let’s play with keys **(B01-CPD)**
    - Generate keys to sign and verify meessages
    - Practice with a Hardware Wallet Simulator

- **Practical Activities**
  - Creating points on the elliptic curve
    - Using a graphing calculator
  - Signing and verifying with cryptography in Bitcoin
    - Creating Bitcoin Keys (Public / Private)
  - Practice with Coldcard Q simulator
    - Simulator Installation
    - Creating a Bitcoin Private Key
    - Exporting to Sparrow Wallet

I was very interested to read your Hashcash paper. I am preparing a paper that expands on your ideas into a complete working system...

- Satoshi Nakamoto - / Email to Adam Back

>_ BLOCK TWO

...transactions must be publicly announced, and we need a system for participants to agree on a single history of the order in which they were received.

- Satoshi Nakamoto / Bitcoin White Paper-

- **Block Objectives**
  - We will explore how Bitcoin keeps an immutable record of all transactions on a blockchain and why this is so secure.
  - We will discover how transactions are carried out in Bitcoin, what a block is, what information it contains, and how blocks are verified to ensure security.
  - We will learn about the SHA-256 algorithm and how it is used to secure the Bitcoin network
  - We will understand what a Bitcoin node is an how each node contributes to the security and decentralization of the network.

DURATION: 4 HOURS
LEVEL: INTERMEDIATE (IT IS NECESSARY TO KNOW THE PREDECESSORS OF BITCOIN)

- **Block Development**
  - Bitcoin Transactions **(B02-TXA)**
    - Digital Signatures
    - UTXOs (Unspent Transaction Outputs)
  - Bitcoin Blocks **(B02-TXB)**
    - Transactions in a Block
    - Block Header
      - Version
      - Previous Block Hash
      - Merkle Root
      - Timestamp
      - Nonce (Number used Once)
      - Bits
    - Hash Security Algorithm (SHA256) **(B02-TXC)**
      - Practice with the SHA256 algorithm bits
      - Practice with Blockchian Simulator
  - Bitcoin Node
    - What is a Bitcoin Node and what does it do?
    - First look at the topic of Open Source

- **Practical Activities**
  - Practice with the SHA256 algorithm
    - We will create a fixed 32-byte message
    - We will learn the importance of collision resistance
  - Practice exploring the Genesis Block
    - We will review Bitcoins first block from 03/JAN/09
  - Practice with Blockchain Simulator
    - We will understand how blocks are linked together

The network timestamps transactions into an ongoing chain of hash-based proof-of-work, forming a record that cannot be changed without redoing the proof-of-work.

- Satoshi Nakamoto - / Bitcoin White Paper

>_ BLOCK THREE

This is a free and open-source project that allows you to try mining a Bitcoin block with a small hardware device. The main goal of this project is to enable you to learn more about mining and to have a beautiful hardware device on your desk.

- BitMaker / Creator of Nerdminer -

- **Block Objectives**
  - Bitcoin 101: We will explore how Bitcoin transactions are grouped into blocks while installing a node.
  - We will learn how new Bitcoin coins are created and how we can participate in this process, even on a small scale.
  - We will use an ESP32 to create a small Bitcoin miner and understand how the network works.

DURATION: 4 HOURS
LEVEL: INTERMEDIATE (IT IS NECESSARY TO KNOW WHAT A BITCOIN BLOCK IS AND ITS COMPONENTS)

- **Block Development**
  - Bitcoin 101 **(B03-MA)**
    - Brief overview of transactions and blocks
    - Different Bitcoin nodes
    - Install a Bitcoin node
  - Mining Concepts (I) **(B03-MB)**
    - Block Reward
    - Mempool (unconfirmed transaction pool)
    - Block Template
    - Number used once (Nonce)
    - Merkle Root
    - Miner
    - Mining Stack
  - Flash Nerdminer on a ESP32 device **(B03-MC)**
    - Open Source review (Github)
    - Generating a Bitcoin address
    - Setting up a NerdMiner on a public Bitcoin Mining Pool

- **Practical Activities**
  - Install a Bitcoin node
    - Download Bitcoin Core
    - Start synchronization with the network
  - Flash an ESP32 (install Nerdminer)
    - Create a Bitcoin address
    - Review the project’s Github
    - Use a public pool as a mining stack
    - Downoad a CP2102 Driver
    - Configure the ESP32 WROOM device

This adds an incentive for nodes to support the network, and provides a way to initially distribute coins into circulation, since there is no central authority to issue them.

- Satoshi Nakamoto - / Bitcoin White Paper

>_ BLOCK FOUR

Bitcoin mining is simpler than you think! It's a guessing game where you look for a magic number that, when added to a block, produces a valid proof of work.

- D-plus-plus / Bitcoin mining simulator -

- **Block Objectives**
  - We will discover how Bitcoin mining has changed over time and why it is so important for keeping the network secure and decentralized.
  - We will learn terms like “difficulty,” “halving,” and “hashrate” and how they affect Bitcoin mining.
  - We will use a simulator to experience firsthand how a block is mined in Bitcoin.

DURATION: 4 HOURS
LEVEL: ADVANCED (IT IS NECESSARY TO KNOW BASIC MINING CONCEPTS)

- **Block Development**
  - Evolution of Bitcoin Mining **(B04-DA)**
    - CPU, GPU, FPGA y ASIC
  - Mining Concepts (II) **(B04-DB)**
    - Hash Rate
    - Difficulty and Difficulty Adjustment
    - Mining Pool and Shares
    - SHA256: How is it used in Mining?
    - Halving
      - Bitcoin Supply Equation
  - Competition with an Online Mining Simulator **(B04-DC)**
    - Let’s learn concepts while playing!
      - Network Difficulty
      - Block Reward
      - Nonce

- **Practical Activities**
  - Let’s solve the Bitcoin supply equation.
    - Math supports Bitcoin, and we’re going to prove it by solving the Bitcoin supply equation.
  - Let’s play as Miners!
    - We will learn mining with an online mining simulator that allows you to adjust the network difficulty and add a nonce to find a Bitcoin block.

If many people do this, then we all play a signinficant role in decentralizing the hash rate and enduring censorship resistance, for which Bitcoin is so famous.

- Skot - / Bitaxe

>_ BLOCK FIVE

To achieve much more than 47,00 transactions per second with Bitcoin, it is necessary to conduct transactions outside of Bitcoin's own blockchain.

- Joseph Poon, Thaddeus Dryja / Lightning Network Paper -

- **Block Objectives**
  - We will learn about the Lightning Network in three different ways:
    - Airport analogy
    - Technical description of the network
    - "LN Ropes and Hair Ties" Game
  - Setting up a Lightning Network infrastructure
    - Polar Lightning Network
    - GetAlby extension
    - Zeus Wallet LN

DURATION: 4 HOURS
LEVEL: ADVANCED (IT IS NECESSARY TO KNOW BITCOIN AND MINING)

- **Block Development**
  - Lightning Network: Airport Analogy **(B05-LNA)**
    - Learn the basics of Lightning Network
  - Lightning Network: Technical Description **(B05-LNB)**
    - Implementations and nodes
    - Payment Channels
    - Liquidity Management
    - Payment Routing
    - HTLC (Hash Time-Locked Contracts)
  - Setting up LN Infrastructure **(B05-LNC)**
    - Lightning Network Polar
      - Bitcoin node Installation (Regtest)
      - Lightning LND node Installation
    - GetAlby extension installation
      - Certificate and Macaroon installation
      - Connect LND node to web extension
    - Zeus LN installation
      - Connect LND Node to Mobile Wallet
      - Macaroon installation

- **Practical Activities**
  - Let’s play with Lightning Polar!
    - Create Bitcoin and Lightning Network Nodes
    - Install GetAlby Web Extension
    - Install Zeus Mobile Lightning Network App
    - Connect nodes to the extension and the app
    - Make transactions in the classroom with your peers
  - Let’s play at creating a lightning network!
    - Create a network of students actions as a Lightning Network Nodes to reinforce concepts such as:
      - Total Capacity
      - Inbound Capacity / Outbound Capacity

Censorship in the modern world is the algorithmic amplification of certain messages and ideas and the suppression of other messages and ideas.

- Matt Hill - Start9

>_ BLOCK SIX

We can guarantee opportunities for everyone, but not that everyone will succeed...

- Max Keiser -

- **Block Objectives**
  - Install a Bitaxe miner and understand why it is important for many different people to participate in mining.
  - GPG Workshop
    - We will learn how to create RSA keys and send encrypted messages.
    - We will use digitial signatures to verifiy the authenticity of the documents and messages.
  - We will take a fun quiz to review everything you've learned about Bitcoin.

DURATION: 4 HOURS
LEVEL: ADVANCED (IT IS NECESSARY TO KNOW BITCOIN / LIGHTNING NETWORK)

- **Block Development**
  - Bitaxe Installation **(B06-ZA)**
    - Brief description of the hardware and it’s history.
    - Installation of “Ride the Lightning”
      - (Bitcoin Node Graphical Interface)
    - Public Pool Installation
    - Bitaxe Configuration
  - GPG Workshop **(B06-ZB)**
    - Brief history of the predecessor PGP (Phil Zimmermann)
    - RSA key creation
    - Encrypt / Decrypt files
    - Sign and verify files
  - Next steps as a Node Nation student **(B06-ZC)**
    - Listen to Podcast (Español)
      - Lunaticoin Podcast
      - 402 payment required Channel
    - Stack Sats
      - Stacker news
      - Thunder Games / ZBD games
      - Fountain App
  - Bitcoin Knowledge Quiz **(B06-ZX)**

- **Practical Activities**
  - Bitaxe Installation
    - Configure the Bitaxe for solo mining from our own node.
    - Set up the Bitaxe hardware to mine bitcoin using pulic pool software
  - GPG Workshop
    - Create a key pair to encrypt and decrypt files.
    - Sign and verify signatures

Never in my wildest dreams did I think I would one day travel to El Salvador, and yet here I am...

- Stacy Herbert -

BASIC — LEVEL
BG-FD — CURRENT SUBJECT
NONE — PREREQUISITE

>_ SUBJECT TABLE

BG	B01	B02	B03	B04	B05	B06
BASIC **BG-DA** NONE	INTERMEDIATE **B01-CPA** BG-CD	INTERMEDIATE **B02-TXA** B01-BD	INTERMEDIATE **BO3-MA** B02-TXA B02-TXB	ADVANCED **B04-DA** NONE	ADVANCED **B05-LNA** B04-DB	ADVANCED **B06-ZA** B03-MC
BASIC **BG-DB** BG-AD	INTERMEDIATE **B01-CPB** B01-BA	INTERMEDIATE **B02-TXB** B02-TXA	INTERMEDIATE **B03-MB** B03-MA	ADVANCED **B04-DB** B03-MB	ADVANCED **B05-LNB** B05-LNA	ADVANCED **B06-ZB** B06-ZA
BASIC **BG-DC** BG-BD	INTERMEDIATE **B01-CPC** B01-BB	INTERMEDIATE **B02-TXC** B02-TXB	INTERMEDIATE **B03-MC** B02-TXB	ADVANCED **B04-DC** B02-TXC	ADVANCED **B05-LNC** B03-MA B05-LNB	ADVANCED **B06-ZC** NONE
	INTERMEDIATE **B01-CPD**					ADVANCED **B06-ZX** ALL PREVIOUS COURSEWORK