Lab Session: Block Explorer Analysis
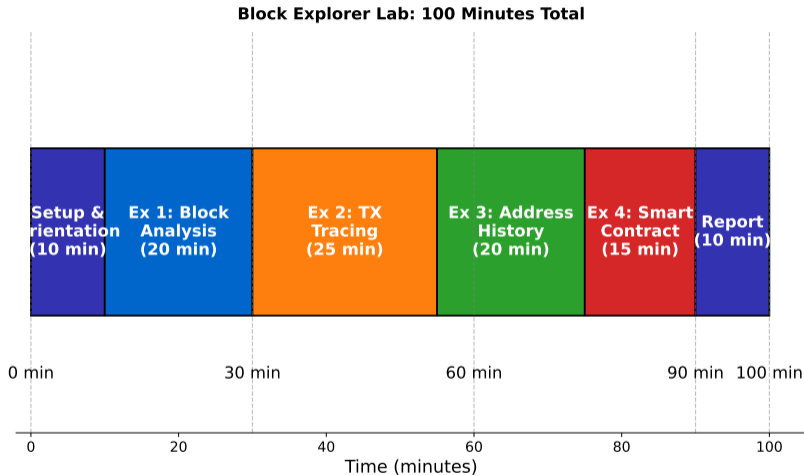### BSc Blockchain, Crypto Economy & NFTs

Course Instructor

Module A: Blockchain Foundations

Learning Objectives

By the end of this lab session, you will be able to:

- Navigate Etherscan and Blockstream block explorers
- Analyze transaction details: inputs, outputs, fees
- Trace transaction lifecycle from broadcast to confirmation
- Examine block structure and validator information
- Investigate address activity and transaction history
- Conduct basic blockchain forensic analysis

Block Explorer Lab: 100 Minutes Total

| Setup & Orientation (10 min) | Ex 1: Block Analysis (20 min) | Ex 2: TX Tracing (25 min) | Ex 3: Address History (20 min) | Ex 4: Smart Contract (15 min) | Report (10 min) |

0 min   30 min   60 min   90 min   100 min

Time (minutes)

Total duration: 100 minutes with 4 main exercises

What is a Block Explorer?

Definition:
- Web-based interface to query blockchain data
- Provides human-readable view of blocks, transactions, addresses
- Free and publicly accessible

Major Block Explorers:

Bitcoin:
- Blockstream.info
- Blockchain.com
- Mempool.space

Ethereum:
- Etherscan.io
- Blockscout.com
- Ethplorer.io

Transaction Anatomy: Key Fields to Analyze

TRANSACTION

TX Hash:	0x7f9...3ab	**Block:**	18,234,567
From:	0xSender...	**Gas Used:**	21,000
To:	0xReceiver...	**Gas Price:**	25 Gwei
Value:	1.5 ETH	**Status:**	Success

Understanding these fields is essential for analyzing any blockchain transaction

Exercise 1: Analyzing Bitcoin Transactions

Instructions:

1. Visit: https://blockstream.info
2. Search for the first-ever Bitcoin transaction:
   f4184fc596403b9d638783cf57adfe4c75c605f6356fbc91338530e9831e9e16
3. Examine: inputs, outputs, fee, block number, confirmations

Key Observations:

- **Inputs:** Reference to previous transaction output
- **Outputs:** New UTXOs with amounts and addresses
- **Fee:** Difference between input sum and output sum
- **Confirmations:** Blocks built on top of this transaction

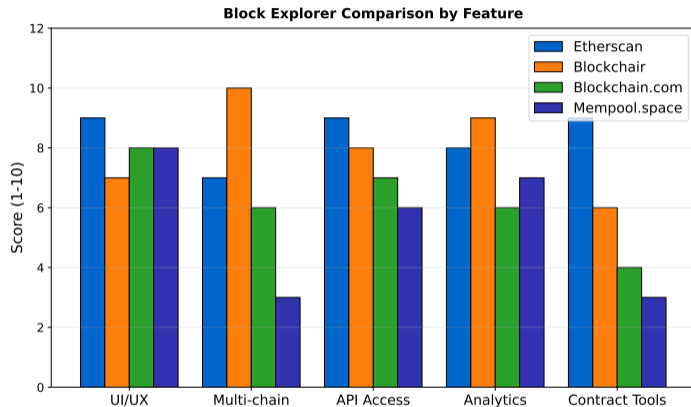# Exercise 2: Analyzing Ethereum Transactions

Instructions:

1. Visit: `https://etherscan.io`
2. Select a recent transaction from homepage
3. Examine: hash, status, block, from, to, value, gas

Gas Mechanics:

- Gas Limit: Maximum gas user willing to pay
- Gas Used: Actual gas consumed
- Gas Price: Price per unit (in gwei)
- Transaction Fee: Gas Used $\times$ Gas Price

Example: 21,000 gas $\times$ 32 gwei $=$ 0.000672 ETH

Block Explorer Comparison by Feature

Etherscan excels for Ethereum; Blockchair for multi-chain research

Exercise 3: Address Investigation

Entity Types to Analyze:

1. **Exchange Address:** High volume, large balances, labeled
2. **Smart Contract:** "Contract" label, receives interactions
3. **Individual User:** Low volume, smaller balances

Sample Addresses:

- Binance: `0x28C6c06298d514Db089934071355E5743bf21d60`
- Uniswap: `0xE592427A0AEce92De3Edee1F18E0157C05861564`
- Your MetaMask address (from Lab 8)

Exercise 4: Forensic Case Study

Scenario: Tracking fund flows

Investigation Steps:

1. Confirm source transaction
2. Click on destination address
3. View subsequent transactions
4. Follow the chain of transfers
5. Document path with transaction hashes

Privacy Techniques to Recognize:

- Mixers/Tumblers (e.g., Tornado Cash)
- CoinJoin transactions
- Exchange deposits (off-chain after deposit)

Submit the following:

1. **Transaction Analysis Report (2-3 pages):**
   - Bitcoin transaction: hash, inputs/outputs, fee
   - Ethereum transaction: hash, gas breakdown
   - Three addresses with entity type identification

2. **Screenshots:**
   - Bitcoin and Ethereum transaction details
   - Block details page
   - Address activity page

Submission Deadline: One week from lab session

Key Takeaways

- Block explorers provide transparency into all blockchain activity
- Bitcoin uses UTXO model; Ethereum uses account model
- Gas fees vary based on network congestion
- Addresses can be identified by transaction patterns
- Blockchain forensics is powerful but faces privacy challenges
- Verified smart contracts allow code auditing

Real-World Applications:
- Auditing and compliance
- Fraud investigation
- Market analysis (whale watching)