- The **Pure Go Ethereum Integration syllabus** (basic to advanced)

- An **8-week study plan**

- And an **intro to basic blockchain concepts** in the early stages

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Pure Go Ethereum Integration Syllabus + 8-Week Study Plan (with Basic Blockchain Intro)

Module / Week	Topics	Details / Skills Covered	Recommended Resources
Module 1: Introduction & Basics / **Week 1**	- Introduction to Blockchain & Ethereum- What is Ethereum?- Blockchain fundamentals- Geth overview & architecture- Installing and running Geth node- Go language basics for Geth	Understand blockchain principles, Ethereum architecture, setup Geth, Go environment setup	- [Ethereum.org intro](#)- [Geth docs](#)- [Tour of Go](#)
Module 2: Basic Geth Integration / **Week 2-3**	- Connecting to Geth via RPC (JSON-RPC & WebSocket)- Querying blockchain data (blocks, txs, accounts)- Sending transactions (Ether transfers)- Smart contract basics & interaction using `ethclient` and `abigen`	Using `ethclient`, reading blockchain data, sending Ether transactions, generating Go contract bindings, calling contracts	- `go-ethereum` GitHub repo https://github.com/ethereum/go-ethereum- JSON-RPC API docs: https://eth.wiki/json-rpc/API- Solidity docs
Module 3: Intermediate Geth Integration / **Week 4-5**	- Wallet & private key management in Go- Advanced transaction management (nonce, gas, replacement)- Event filters and subscriptions (logs & real-time)- Working with ABI encoding/decoding and dynamic calls	Account creation, managing keystore files, handling nonce and transaction pools, setting up event subscriptions, ABI usage	- `accounts` and `crypto` packages in go-ethereum- Event subscriptions tutorial- `abigen` tool documentation
Module 4: Advanced Geth & Blockchain Development / **Week 6**	- Setting up private Ethereum networks- Creating custom genesis files- Understanding sync modes (full, light, archive)- Extending/customizing Geth (custom RPC APIs)- Debugging and profiling Geth nodes	Running private testnets, network config, light vs full nodes, adding custom RPC, debugging and profiling Geth	- Geth private network tutorial https://geth.ethereum.org/docs/tutorial/private-network- Geth dev tools

Module / Week	Topics	Details / Skills Covered	Recommended Resources
Module 5: Integration Best Practices & Ecosystem / **Week 7-8**	- Security best practices (key handling, RPC security)- Performance optimization and scaling- Cross-chain and Layer 2 basics- Writing tests & integrating CI/CD for blockchain apps	Secure key storage, RPC endpoint security, efficient blockchain querying, Layer 2 concepts, testing smart contracts & Go apps	- Ethereum security checklist- Go testing & benchmarking- Layer 2 documentation- CI/CD for blockchain workflows

| **Suggested Hands-on Projects** | - Build CLI wallet using Go Ethereum- Backend for dApp interacting with smart contracts- Event-driven notification system via contract logs- Private Ethereum testnet setup and contract deployment- Custom RPC endpoint development for Geth | Practical applications to solidify integration skills and Geth usage | - Example GitHub repos- Tutorials and community projects |

| **Core Tools & Resources** | - Official Go Ethereum repo- `abigen` and Solidity- Ethereum JSON-RPC docs- Go Ethereum tutorials and examples | Essential references and development tools | - [Go Ethereum GitHub](#)- [Solidity docs](#)- [Eth JSON-RPC](#) |

How this helps:

- **Week 1** starts with **basic blockchain fundamentals** so you get context.

- Then you gradually dive into **pure Go Ethereum integration** topics.

- By **Weeks 7-8**, you cover **best practices, security, and testing**.

- The **project ideas** are practical and span beginner to advanced use cases.

8-Week Study Plan for Pure Go Ethereum Integration

Week	Topics	Goals / Outcomes	Resources
1	Ethereum Basics & Geth Setup	Understand Ethereum, blockchain, install & run Geth	- [Ethereum.org intro](#)- Geth official docs https://geth.ethereum.org/docs/

Week	Topics	Goals / Outcomes	Resources
2	Go Language Basics for Ethereum	Basic Go syntax, setup Go environment, import go-ethereum	- [Tour of Go](#)- `go-ethereum` GitHub https://github.com/ethereum/go-ethereum
3	Connecting & Querying Blockchain Data	Connect to Geth RPC, fetch blocks, transactions	- `ethclient` package docs- JSON-RPC intro: https://eth.wiki/json-rpc/API
4	Sending Transactions & Wallet Management	Create/sign/send txs, manage keys and keystores	- `accounts` package in go-ethereum- `crypto` package- Tutorials on signing transactions in Go
5	Smart Contract Interaction	Generate Go bindings (`abigen`), call contract methods	- `abigen` docs- Solidity official docs- Example contracts on GitHub
6	Event Logs & Filters, Advanced Tx Management	Set up event subscriptions, manage nonce, tx pool	- Event filters tutorial- WebSocket subscriptions in Go- Transaction lifecycle docs
7	Private Networks & Customizing Geth	Setup private chain, custom genesis, extend Geth RPC	- Private network guide https://geth.ethereum.org/docs/tutorial/private-network
8	Security, Performance & Testing	Security best practices, profiling, testing strategies	- Security checklist- Go testing packages- Benchmarking Go Ethereum code

Additional Notes & Tips:

- **Practice Coding**: Build small apps each week (e.g., simple wallet, blockchain explorer CLI).

- **Use Geth Dev Mode**: Run `geth --dev` to spin up a fast local chain for testing.

- **Follow Go Ethereum Repo Issues & Discussions**: Great for latest features and debugging.

- **Join Ethereum Dev Forums & Discords**: Collaborate and get help from the community.