Full Day Training Plan for Professional Go

Days	Modules	Highlight of the Topic
Day 1	Module 1, 2, 3	Core language fundaments
Day 2	Module 4	User-defined type system, writing idiomatic Go code
Day 3	Module 5 ,6	concurrency programming
Day 4	Module 7, 8	Go modules, HTTP programming
Day 5	Module 9,10,	RESTful APIs Testing Go code
Day 6	Module 11, 12, 13	Mini project ,Generics , Package Context and structured logging
Day 7	Module 14,15	Advanced Goroutines & SQL/NoSQL Databases
Day 8	Module 16,17	Cli application & Behavior-Driven Development (BDD)
Day 9	Module 18,19	gRPC and Protocol Buffers , ORM
Day 10	Module 20,21,22,23	GORM, Microservices,Microservices and Cloud Native
Day 11	Module 24,25,26	Kafka , CockroachDB , NATS
Day 12	Module 27,28	SAAS project | docker kubernetes

Course Outline:

Module No.	Module Name and Contents
1.	**Introduction to Go** • Introduction to Go programming language • Setting up Go development environment
2.	**Go Language Fundamentals** • Core language fundamentals • Functions • Arrays, Slices and Maps • Defer, Panic and Recover

	• Error handling
3.	**User-Defined Type System and Idiomatic Go** • A deep dive into Go's type system • Introduction to Structs and Interfaces
4.	**Idiomatic Go** • Adding Behaviors to Structs • Value Receivers and Pointer Receivers • Using composition pattern for building data model for Go apps • Using interface and structs for writing idiomatic Go code with SOLID principles and Clean architecture **Go Package Ecosystem** • A deep dive into package ecosystem in Go • Writing packages • Go Tools • Using Go standard library packages • Using third-party packages

5.	**Concurrency Programming** • Concurrency in Go • Goroutines • Channels • Unbuffered Channels • Buffered Channels • Channel Select • Advanced Concurrency patterns
6.	**Mutexes for preventing race conditions** • Preventing data race conditions with Mutexes
7.	**Go Modules** • Dependency management in Go • Working with Go Modules
8.	**HTTP Programming and RESTful APIs: From basics to building production ready backend APIs** • A deep dive into Go's http package • ServeMux, Handler and HandlerFunc • Extending Go's http package by using third-party packages • Routing using Gorilla Mux/ go-chi • Writing HTTP middleware • Building real-world RESTful APIs • net/http basics, ServeMux, HandlerFunc, GET/POST endpoints • Hands-on Lab: Expose /users endpoints

9.	**Introduction to Go Web Frameworks** • The Go philosophy about Web frameworks Vs Libraries • Introduction to Echo/Gin web framework
10.	**Testing Go Applications** • Test-Driven Development (TDD) • Writing unit tests • Writing Benchmark tests • Testing HTTP applications • Mocking Go interfaces • Mocking with GoMock - A mock framework for Go
11.	**Go Generics** • Creating generic functions to handle multiple types • Creating type constraints • Working with generics
12.	**Package Context** • Creating Context type for carrying deadlines and cancellation signals • Creating Context type for sharing request-scoped values Hands-on Lab: Implement concurrent user processing with error propagation
13.	**Structured logging with slog** • Introduction to structured logging • Structured logging with slog (official logging package from Go 1.21.0) • Built-in handlers in slog Mini project : Hands-on Lab: Convert User Service to Gin framework

Module No.	Module Name and Contents	Duration
14	**Advanced Concurrency Programming Patterns** • Managing Goroutines with Package context •Buffered/unbuffered channels, select statement, synchronization • Mutexes and preventing race conditions • Propagating errors from Goroutines • Coordinating group of Goroutines and propagating errors with Package errgroup • Coordinating group of Goroutines and propagating errors with Package oklog/run	**5 Hour**

15	**Working with SQL/NoSQL Databases** • Working with SQL Databases • Working with NoSQL Databases, with MongoDB	**4 Hour**
16.	**Behavior-Driven Development (BDD) with Ginkgo** • Writing BDD-styled testing • A deep dive into Ginkgo v2, BDD test framework • Mocking Go interfaces • Mocking with GoMock - A mock framework for Go • Integrating GoMock with Ginkgo BDD test framework	**4 Hour**
17.	**Building CLI appplications** • Building CLI applications with Cobra • Adding interactive prompts for CLI applications.	**4 Hour**
18	**Building APIs using gRPC and Protocol Buffers** • Introduction to gRPC • Introduction to Protocol Buffers • Building APIs with gRPC and Protocol Buffers	**5 Hour**
19.	**Ent: An entity framework / ORM for Go** • Introduction to ent • Schema and code generation • Entity fields • Entity edges • Creating Graphs • Querying data • Working with Ent • The Ent ecosystem: The big picture	**3 Hour**
20.	**GORM: An ORM library for Go** • Introduction to GORM • Working with GORM	**2 Hour**

Module No.	**Module Name and Contents**
21.	**A Primer on Microservices and Cloud Native** • Introduction to Cloud Native • Introduction to Microservices based distributed systems

	• Pros and Cons of Microservices • Practical challenges with Microservices

22.	**Decomposition patterns for Microservices** • Introduction to Domain-Driven Design (DDD) • Building blocks of Domain-Driven Design • Decomposing Microservices with Bounded Context pattern • Building Microservices with Domain-Driven Design Aggregate and Domain Events
23.	**Building high performance APIs using gRPC and Protocol Buffers** • Introduction to gRPC – A communication patterns for Microservices • Introduction to Protocol Buffers • Building APIs with gRPC and Protocol Buffers • Writing Streaming APIs • Error handling in gRPC • Writing Interceptors in gRPC
24.	**Working with Kafka , CockroachDB – A distributed fault tolerant database (Used for demos)** • Introduction to Kafka • Introduction to Kafka producer consumer • Introduction to CockroachDB • Running CockroachDB clusters • Working with CockroachDB
25.	**An overview on Event-Driven Architetcures** • Real-world challenges of Microservices with managing transactions and querying data • How to solve the challnges of Microservices with decentralized data • Introduction to event-driven architetcures • Event Sourcing and CQRS
26.	**Building Event-Driven Distributed Systems and Microservices with NATS and NATS JetStream** • Introduction to NATS Ecosystem and NATS related messaging patterns • Introduction to distributed streaming systems • Introduction to NATS JetStream • Building next-generation distributed systems with NATS JetStream • Working with NATS JetStream Key Value store
27.	**Building Modern Distributed Applications in Go with SAAS** • Microservices Skeleton Setup • Scaffold User, Billing, Payment services • Define communication patterns (REST/gRPC) •SaaS Billing Module Design •Define modules: User, Subscription, Payment, Invoicing • Service boundaries and responsibilities •Case Study: Multi-service User/Auth/Billing architecture
28.	**Building Microservices with Docker | Kubernete's**

	Docker Compose & Kubernetes Deployment Docker Basics & Containerization Dockerfile, images, containerize all services Compose YAML for multi-service app, deploy in Minikube/K8s cluster Metrics, structured logging with slog Horizontal scaling, service replicas, load balancing demo