Full Stack & AI Development Syllabus

A Comprehensive 26-Week Course for Modern Web and AI Integration

Prepared by Salman Khan

June 17, 2025

Empowering the Future of Technology

Contents

Phase 1: Full Stack Development

Overview

This phase focuses on building a solid foundation in full stack development, covering programming fundamentals, backend and frontend technologies, databases, and version control. By the end, learners will be able to create robust, scalable web applications.

1 Week 1–2: Programming Foundations

1.1 Objectives

Master the basics of programming and problem-solving using Python.

1.2 Topics

- Python basics: syntax, variables, loops, conditionals
- Object-Oriented Programming (OOP): classes, objects, inheritance
- Data structures: lists, dictionaries, stacks, queues
- Algorithms: searching, sorting, recursion essentials

2 Week 3–4: Backend Development with FastAPI

2.1 Objectives

Develop RESTful APIs and secure backend systems.

2.2 Topics

- REST API design and development
- Authentication: JWT, OAuth2
- FastAPI framework: routing, validation, async programming
- Connecting FastAPI with PostgreSQL

3 Week 5: Database Management

3.1 Objectives

Understand relational databases and optimize data storage.

3.2 Topics

- PostgreSQL: schema design, CRUD operations
- ORM with SQLAlchemy: models, relationships
- Advanced queries: joins, indexing, optimization

4 Week 6: Version Control

4.1 Objectives

Learn collaborative development using Git and GitHub.

4.2 Topics

- Git fundamentals: commits, branches, merges
- GitHub: repositories, pull requests, CI hooks
- Branching strategies: feature branches, release cycles

5 Week 7–8: Frontend with JavaScript & TypeScript

5.1 Objectives

Build dynamic and type-safe frontends.

5.2 Topics

- JavaScript: DOM manipulation, events, ES6+
- TypeScript: types, interfaces, generics
- Asynchronous programming: promises, async/await

6 Week 9–11: Next.js & React

6.1 Objectives

Create modern, scalable web applications with React and Next.js.

6.2 Topics

- React: components, hooks, lifecycle
- Next.js: server-side rendering, static generation, routing
- State management: Context API, Redux Toolkit
- API integration and frontend authentication

7 Week 12: UI Design with TailwindCSS

7.1 Objectives

Design responsive and user-friendly interfaces.

7.2 Topics

- TailwindCSS: utility-first styling, customization
- Responsive design: breakpoints, mobile-first approach
- Component styling best practices

Phase 2: AI & Integration

Overview

This phase introduces artificial intelligence concepts and their integration into full stack applications, enabling learners to embed AI functionalities seamlessly.

8 Week 13–14: Introduction to AI

8.1 Objectives

Understand the fundamentals of AI and its applications.

8.2 Topics

- Definitions: AI, Machine Learning, Deep Learning
- Real-world use cases: chatbots, recommendation systems
- Ethical considerations in AI development

9 Week 15–16: AI Model Integration

9.1 Objectives

Integrate AI models into web applications.

9.2 Topics

- Calling external AI APIs (e.g., Gemini API, Hugging Face)
- Embedding LLMs in FastAPI and Next.js
- Handling API responses and error management

10 Week 17–18: Custom AI Model Training

10.1 Objectives

Train and deploy custom AI models.

10.2 Topics

- Open-source models: Hugging Face transformers
- Supervised learning basics: datasets, training loops
- Hosting/training on Google Colab or cloud platforms

Phase 3: DevOps & Deployment

Overview

This phase equips learners with skills to deploy, scale, and maintain applications using modern DevOps practices, ensuring production-ready systems.

11 Week 19–20: Docker

11.1 Objectives

Containerize applications for consistent environments.

11.2 Topics

- Dockerfile: images, containers, layers
- Docker Compose: multi-service orchestration
- Best practices for container management

12 Week 21–22: Kubernetes

12.1 Objectives

Orchestrate containerized applications at scale.

12.2 Topics

- Kubernetes: pods, services, deployments
- Helm Charts: package management
- Cluster scaling and high availability

13 Week 23–26: Deployment & Monitoring

13.1 Objectives

Deploy and monitor applications in production.

13.2 Topics

- CI/CD pipelines with GitHub Actions
- Hosting: Vercel, Railway, Render
- Logging, monitoring, and rollback strategies

Ready to Build the Future?

This syllabus is designed to transform you into a full stack developer with AI integration and DevOps expertise. Start your journey today!

Visit salmandeveloper.xyz for More Resources