

Backend Development Course:

A 2-Month Curriculum

Course Overview:

This comprehensive course is designed to equip you with the essential skills to become a proficient backend developer. You'll delve into the foundational concepts of programming, database systems, and server-side technologies to build robust and scalable web applications.

Key Topics:

- 1. Programming Fundamentals:
 - Introduction to programming paradigms (procedural, object-oriented)
 - Core programming concepts (variables, data types, operators, control flow)
 - Functions and modules
 - Problem-solving and algorithmic thinking
- 2. Server-Side Technologies:
 - HTTP protocol and RESTful API design
 - Node.js and Express.js framework
 - Server-side rendering and templating engines

• Asynchronous programming and event loops

3. Database Systems:

- Relational databases (SQL) and SQL query language
- NoSQL databases (MongoDB) and document-oriented data modeling
- Database design and normalization
- Database optimization and performance tuning

4. Web Application Development:

- Building RESTful APIs with Node.js and Express.js
- Handling requests, responses, and error handling
- Data validation and sanitization
- Authentication and authorization mechanisms
- Session management and cookies

5. Advanced Topics:

- WebSockets and real-time communication
- Microservices architecture
- Cloud deployment and infrastructure as code
- Testing and debugging techniques
- Security best practices

Learning Outcomes:

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

- Understand the fundamental principles of backend development
- Design, develop, and deploy robust web applications
- Work with various database systems to store and retrieve data efficiently
- Implement secure authentication and authorization mechanisms
- Optimize application performance and scalability
- Troubleshoot and debug backend issues effectively

Module 1: Fundamentals of Programming (2 Weeks)

• Introduction to Programming:

- What is programming?
- Why backend development?
- Basic programming concepts (variables, data types, operators)
- Introduction to a Programming Language (Python/Node.js):
 - Installation and setup
 - Basic syntax and structure
 - Control flow statements (if-else, loops)
 - Functions
- Data Structures and Algorithms:
 - Arrays, lists, dictionaries/objects
 - Time and space complexity
 - Basic algorithms (sorting, searching)

Module 2: Backend Development Basics (3 Weeks)

- Introduction to Backend Development:
 - What is a backend?
 - How does it work with the frontend?
 - The role of servers
- HTTP Protocol:
 - Basics of HTTP requests and responses
 - Methods (GET, POST, PUT, DELETE)
 - Status codes
- API Design and RESTful APIs:
 - Principles of RESTful API design
 - Resource-based routing
 - API documentation (Swagger, OpenAPI)

Module 3: Database Systems (3 Weeks)

• Introduction to Databases:

- What is a database?
- Types of databases (SQL, NoSQL)

• SQL Basics:

- SQL syntax and queries
- Data Definition Language (DDL)
- Data Manipulation Language (DML)
- Data Query Language (DQL)
- NoSQL Databases (MongoDB):
 - Introduction to NoSQL databases
 - Basic MongoDB operations
 - Document structure and querying

Module 4: Backend Frameworks (4 Weeks)

- Framework Selection:
 - Choosing a framework based on project requirements (Django, Flask, Express.js, Node.js)
- Framework Basics:
 - Routing and controllers
 - Templating engines
 - Database integration
- Building RESTful APIs with Frameworks:
 - Handling requests and responses
 - Error handling and validation
 - Authentication and authorization
- Deployment:
 - Deploying applications to cloud platforms (Heroku, AWS, GCP)
 - Setting up servers (Nginx, Apache)

Module 5: Advanced Topics (2 Weeks)

- Asynchronous Programming:
 - Understanding asynchronous operations
 - Event loops and callbacks
 - Promises and async/await
- Caching:
 - Improving application performance with caching
 - Cache strategies (HTTP caching, database caching)

• Security:

- Protecting applications from vulnerabilities
- Input validation and sanitization
- Secure authentication and authorization
- Testing and Debugging:
 - Unit testing and integration testing
 - Debugging techniques
 - Code profiling and optimization

Course Overview

1. Discuss with Hallil about what if function is 10% only bug

This comprehensive Basic Web Development course is designed to introduce you to the fundamental concepts of web development. You'll learn the building blocks of web pages: HTML, CSS, and JavaScript. Through hands-on projects and expert guidance, you'll gain a solid foundation in web development and be able to create dynamic and interactive web pages.

Why Choose This Course?

• Industry-Relevant Skills: Learn the core skills needed for web development.

- Hands-On Projects: Gain practical experience by building real-world web pages.
- Expert Instructors: Learn from experienced professionals who are passionate about teaching.
- Flexible Learning: Choose from a variety of learning formats to fit your lifestyle.
- Career Advancement: Boost your career prospects and explore various web development roles.

What You'll Learn

- HTML:
 - Structure and semantics of HTML
 - Creating basic web pages
 - Headings, paragraphs, links, images, and lists
 - Tables and forms
 - HTML5 semantic elements
- CSS:
 - Styling HTML elements with CSS
 - CSS selectors and properties
 - Box model and layout techniques
 - Responsive web design
 - CSS frameworks (Bootstrap, Tailwind CSS)
- JavaScript:
 - Introduction to JavaScript
 - Variables, data types, and operators
 - Control flow (if/else, loops)
 - Functions
 - DOM manipulation
 - Event handling

• Asynchronous JavaScript (AJAX)

Tools & Technologies

- Text Editor: Visual Studio Code or similar
- Browser: Chrome, Firefox, or Edge

Curriculum

Month 1: HTML Fundamentals

- Introduction to Web Development
- Basic HTML Structure
- Headings, Paragraphs, and Links
- Images and Lists
- Tables and Forms
- HTML5 Semantic Elements

Month 2: CSS Styling

- Introduction to CSS
- CSS Selectors
- CSS Box Model
- CSS Layout Techniques
- Responsive Web Design
- CSS Frameworks (Bootstrap, Tailwind CSS)

Month 3: JavaScript Basics

- Introduction to JavaScript
- Variables, Data Types, and Operators
- Control Flow
- Functions
- DOM Manipulation
- Event Handling

• Asynchronous JavaScript (AJAX)

Additional Notes:

- Hands-on Projects: Incorporate regular hands-on projects throughout the curriculum to reinforce learning and build a portfolio.
- Code Reviews and Feedback: Provide constructive feedback on students' code to improve their skills.
- **Best Practices:** Teach industry-standard best practices for web development.
- **Career Guidance:** Offer guidance on job search strategies, resume writing, and interview preparation.