Backend Development Roadmap (Zero to Hero – 1 Year)

1. **Month 1–2: Fundamentals of Programming** Goal: Understand the basics of coding and programming logic.

- Languages: Python or JavaScript (Node.js backend)
- Topics:
- Variables, Data Types, Operators
- Loops & Conditionals
- Functions & Scope
- Data Structures (Lists, Arrays, Dictionaries/Objects)
- Free Resources:
- Python Crash Course – YouTube: https://www.youtube.com/watch?v=rfscVS0vtbw
- JavaScript Basics – freeCodeCamp: https://www.freecodecamp.org/learn/javascript-algorithms-and-data-structures/
- Codecademy Free Python Course: https://www.codecademy.com/learn/learn-python-3

2. **Month 3: Git, Version Control & Basic Terminal** Goal: Learn to use Git and GitHub for version control, and basic terminal commands.

- Topics:
- Git basics: init, clone, commit, push, pull, branch
- GitHub repositories
- Command-line basics
- Free Resources:
- Git & GitHub Crash Course – YouTube: https://www.youtube.com/watch?v=RGOj5yH7evk
- Git Documentation: https://git-scm.com/doc
- GitHub Learning Lab: https://lab.github.com/

3. **Month 4–5: Backend Core Concepts** Goal: Understand how backend works, request-response cycle, servers, and APIs.

- Topics:
- HTTP/HTTPS, REST APIs
- CRUD operations
- JSON & Serialization
- MVC architecture
- Free Resources:
- REST API Tutorial – YouTube: https://www.youtube.com/watch?v=Q-BpqyOT3a8
- MDN HTTP Overview: https://developer.mozilla.org/en-US/docs/Web/HTTP/Overview
- REST API Design Guide – FreeCodeCamp: https://www.freecodecamp.org/news/rest-api-tutorial-rest-client-rest-service-and-api-calls-explained/

4. Month 6–7: Databases Goal: Learn how to store, query, and manage data.

> • Topics:
> • SQL Databases: PostgreSQL, MySQL
> • NoSQL Databases: MongoDB
> • ORMs (Object Relational Mapping)
> • Free Resources:
> • SQL Tutorial – W3Schools: https://www.w3schools.com/sql/
> • MongoDB University Free Courses: https://university.mongodb.com/
> • PostgreSQL Tutorial – freeCodeCamp: https://www.youtube.com/watch?v=qw--VYLpxG4

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5. Month 8: Backend Frameworks Goal: Build scalable backend applications.

> • Languages/Frameworks:
> • Node.js + Express.js
> • Python + Flask/Django
> • Topics:
> • Routing
> • Middleware
> • Templating
> • Error handling
> • Free Resources:
> • Express.js Crash Course – YouTube: https://www.youtube.com/watch?v=L72fhGm1tfE
> • Flask Tutorial – YouTube: https://www.youtube.com/watch?v=Z1RJmh_OqeA
> • Django for Beginners – YouTube: https://www.youtube.com/watch?v=F5mRW0jo-U4

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6. Month 9: Authentication & Security Goal: Secure your backend and handle users safely.

> • Topics:
> • JWT, OAuth, Session-based authentication
> • Password hashing & salting
> • Input validation & sanitization
> • HTTPS, CORS, CSRF protection
> • Free Resources:
> • JWT Tutorial – YouTube: https://www.youtube.com/watch?v=7Q17ubqLfaM
> • Node.js Security Best Practices – Node.js Docs: https://nodejs.org/en/docs/guides/security/
> • OWASP Top 10 Security Risks: https://owasp.org/www-project-top-ten/

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7. Month 10: Testing & Debugging Goal: Ensure your backend is bug-free and maintainable.

> • Topics:
> • Unit testing, Integration testing
> • Testing frameworks (Jest, Pytest)

• Debugging techniques
• Free Resources:
• Jest Crash Course – YouTube: https://www.youtube.com/watch?v=7r4xVDI2vho
• Pytest Tutorial – YouTube: https://www.youtube.com/watch?v=etosV2IWBF0

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8. Month 11: Deployment & DevOps Basics Goal: Learn how to deploy your backend to production.

• Topics:
• Hosting: Heroku, Vercel, AWS Free Tier
• Containerization: Docker basics
• CI/CD pipelines
• Free Resources:
• Deploy Node.js App to Heroku – YouTube: https://www.youtube.com/watch?v=71wSzpLyW9k
• Docker Tutorial for Beginners – YouTube: https://www.youtube.com/watch?v=fqMOX6JJhGo

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9. Month 12: Real Projects & Portfolio Goal: Build real-world projects to showcase your backend skills.

• Project Ideas:
• RESTful Blog API
• E-commerce backend
• Chat app with authentication
• Free Resources:
• Fullstack Open Course: https://fullstackopen.com/en/
• FreeCodeCamp Backend Projects: https://www.freecodecamp.org/learn/back-end-development-and-apis/

Tips: - Stick to one language at first (Python or JavaScript). - Follow the roadmap sequentially. - Build small projects along the way to reinforce learning.