

3 Python Developer Roadmaps That Actually Work

*A structured guide for Python developers looking to specialize in **Data Science**, **Backend Development**, or **Automation & DevOps**.*

🏁 Fundamentals (Common to All Tracks)

- **Core Python:** Variables, Data Types, Loops, Functions
 - **Object-Oriented Programming (OOP)**
 - **Advanced Python:** Generators, Decorators, Metaclasses
 - **Threading, Concurrency & Global Interpreter Lock (GIL)**
 - **Unit Testing:** `unittest` , `pytest`
 - **Virtual Environments & Package Management:** `venv` , `pipenv` , `poetry`
 - **Git & Version Control**
 - **Linux/Bash Scripting**
 - **Basic Database Knowledge:** SQL & NoSQL
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Data Science Roadmap



Essential Libraries

- `numpy` , `pandas` (Data manipulation)
- `matplotlib` , `seaborn` (Data visualization)
- Data cleaning & preprocessing techniques



Math & Statistics

- Probability & Statistics
- Linear Algebra (Vectors, Matrices)
- Calculus Optimization (Gradients, Derivatives)



Machine Learning

- `Scikit-learn` : Supervised & Unsupervised Learning

- Feature Engineering & Model Evaluation
- Hyperparameter Tuning (`GridSearchCV` , `RandomizedSearchCV`)



Deep Learning & AI

- `TensorFlow` / `PyTorch` (Deep Learning Models)
- **Natural Language Processing (NLP):** `nltk` , `spacy` , `transformers`
- **Computer Vision:** `OpenCV` , `YOLO` , `Detectron2`



MLOps & Deployment

- **Model Deployment:** Flask, FastAPI, Streamlit, Gradio
 - **CI/CD for ML:** AWS SageMaker, VertexAI
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Backend Developer Roadmap



Web Development Basics

- HTML, CSS, JavaScript
- HTTP & API Concepts (REST vs GraphQL)



Backend Frameworks

- Flask (Lightweight APIs)
- FastAPI (Asynchronous APIs)
- Django (Full-Stack Framework)



Databases & ORMs

- SQLAlchemy (ORM for Flask, FastAPI)
- Django ORM
- Redis (Caching & Message Queues)
- Database Optimization (Indexes, Query Optimization)



Authentication & Security

- JWT & OAuth2

- API Security (Rate Limiting, CORS, CSRF)
- Hashing & Encryption (`bcrypt` , `argon2`)



Asynchronous & Scalable Backends

- Celery (Task Queues)
- RabbitMQ / Kafka (Message Brokers)
- Async Programming (`asyncio` , `uvicorn`)



Cloud & DevOps

- Docker & Kubernetes (Containerization & Orchestration)
 - CI/CD Pipelines (GitHub Actions, GitLab CI/CD)
 - AWS Services (EC2, S3, Lambda, RDS)
 - Monitoring & Logging (Prometheus, ELK Stack)
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Automation & DevOps Roadmap



Scripting & Automation

- Automate Tasks (`os` , `subprocess` , `shutil`)
- Web Scraping (`Selenium` , `Playwright` , `BeautifulSoup`)
- API Automation (`requests` , `Puppeteer` , `Postman`)

⚙️ Infrastructure as Code (IaC)

- Terraform (AWS, GCP, Azure)
- Ansible (Server Automation)



CI/CD & Deployment

- Jenkins, GitHub Actions, GitLab CI/CD
- Infrastructure Monitoring (Prometheus, Grafana)



Cloud & Networking





- AWS, GCP, Azure

- Load Balancers & Reverse Proxies (Nginx, HAProxy)
- Serverless Architectures (AWS Lambda, GCP Functions)

Cybersecurity & Observability

- Logging & Monitoring (**Graylog** , **ELK Stack**)
 - Security Auditing & Compliance (OWASP, SAST/DAST)
 - Incident Response & Recovery Strategies
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How to Use This Roadmap

-  Pick a specialization: **Data Science, Backend, or DevOps**
-  Follow the sequence: Start with foundations, then move to specialized skills
-  Build **projects** for each skill (e.g., API with Flask, ML model deployment, CI/CD pipeline)
-  Contribute to **open-source** or create a GitHub portfolio

 **Time to start coding!**