free course

Here's the detailed free python roadmap

https://www.geeksforgeeks.org/nation-skill-up/

Not just Python — you'll also get free access to 16 additional career-focused courses:

- Data Analysis
- DevOps
- Software Testing
- Data Science
- Full-Stack Web Development
- Advanced Java
- DSA 360
- DSA 160 *(Ongoing batch, not creating new batches)*
- Java
- C
- C++
- Aptitude & Reasoning
- CS Core Subjects
- Maths for Computer Science
- AI Tools

+ 2 Exclusive Brand Partner Courses:

- MongoDB
- Lyzr AI

ai engineer roadmap

AI Engineer Roadmap (Beginner Friendly)

1. Learn Python Programming

- Basics: variables, loops, functions, OOP
- Data structures: lists, dictionaries, sets, tuples
- File handling, exceptions
- Practice with mini projects
- Libraries: NumPy, Pandas, Matplotlib, Seaborn

---

2. Math for AI

- **Linear Algebra**: Vectors, matrices, dot product
- **Calculus**: Derivatives, gradients (for backpropagation)
- **Probability**: Bayes Theorem, conditional probability
- **Statistics**: Mean, median, mode, standard deviation, distributions

---

3. Machine Learning

- **ML Concepts**:
    - Supervised vs. Unsupervised Learning
    - Overfitting, underfitting, bias-variance
    - Cross-validation, train-test split
- **Algorithms to Learn**:

    - Linear & Logistic Regression
    - Decision Trees, Random Forest
    - KNN, SVM, Naive Bayes
    - K-Means Clustering, PCA
- **Tools**:
    - Scikit-learn
    - Data preprocessing & feature engineering
    - Model evaluation: Accuracy, Precision, Recall, F1, ROC-AUC

---

4. Deep Learning

- **Concepts**:
    - Neural Networks (forward & backpropagation)
    - Activation functions (ReLU, Sigmoid, Softmax)
    - Optimizers (SGD, Adam)
    - Loss functions (MSE, Cross-Entropy)
- **Specialized Networks**:
    - CNN for image data
    - RNN & LSTM for sequences
    - Autoencoders, GANs (basics)
- **Tools**:
    - TensorFlow or PyTorch (choose one)

---

5. Specialization Tracks

- **Natural Language Processing (NLP)**
    - Text cleaning, tokenization, embeddings
    - Transformers, BERT, GPT
    - Hugging Face library
    - Chatbot, Q&A bot projects
- **Computer Vision**
    - OpenCV basics
    - Object detection (YOLO, SSD)
    - Image augmentation, transfer learning
    - Projects: object tracking, OCR, face detection
- **MLOps**
    - Model deployment (FastAPI, Flask)
    - Docker for containerization
    - MLflow for tracking
    - Git/GitHub for version control
- **Reinforcement Learning**
    - Q-learning, Deep Q-Networks
    - OpenAI Gym environments
    - Projects: game bots, maze-solving agents
- **Generative AI (GenAI)**
    - Prompt engineering

- LLMs: GPT, LLaMA, Claude
- Tools: Hugging Face, LangChain, Gradio
- Image/Video AI: DALL·E, Midjourney, Runway ML

---

6. Deployment & Real-World Integration

- Build AI APIs using FastAPI or Flask
- Create frontends with Streamlit or Gradio
- Use Docker to containerize models
- Deploy on platforms like Render, AWS, GCP