Python Full Stack Developer Course Syllabus.

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**1. Core Python Programming**

* Setting up Python environment (IDEs, pip, virtual env)
* Data types, variables, operators
* Control flow (if, loops, comprehensions)
* Functions, modules, packages
* Object-Oriented Programming (classes, inheritance, polymorphism)
* Exception handling
* File handling
* Python libraries (requests, datetime, os, sys)

**2. Front-End Development**

* **HTML5**: semantic tags, forms, multimedia
* **CSS3**: selectors, flexbox, grid, responsive design
* **Bootstrap / Tailwind**: rapid UI design
* **JavaScript (ES6+)**: DOM manipulation, events, promises
* **React.js:** components, props, state, hooks, routing

**3. Back-End Development with Python**

* **Flask** basics: routes, templates, Jinja2 or **Django** framework: MVT architecture, models, views, templates
* REST APIs with Django or Flask-RESTful
* Authentication & authorization (JWT, OAuth)
* Middleware, sessions, cookies

**4. Databases**

* **SQL**: queries, joins, normalization
* **MySQL**: relational DBs or **SQLite**: lightweight DB for dev
* **MongoDB**: NoSQL basics

**5. Version Control & Collaboration**

* Git basics: GitHub/GitLab workflows (pull requests, issues)

**6. Deployment & Cloud**

* Hosting apps on **AWS or Azure**
* Docker basics (containers, images)
* Nginx/Gunicorn for production
* Environment variables & secrets management

**7. Advanced Topics(optional)**

* WebSockets (real-time apps with Django Channels / Socket.IO)
* Caching (Redis, Memcached)
* Unit testing & pytest
* Security best practices (CSRF, XSS, SQL injection prevention)
* Performance optimization

**8. Capstone Projects(optional)**

* E-commerce site (React + Django REST + Stripe payments)
* Chat app (WebSockets + Redis)
* AI-powered app (integrating ML models with Flask/Django)

**Machine Learning Course Syllabus**

**Core Concepts**

* Introduction to Machine Learning
* Types of ML: Supervised, Unsupervised, Reinforcement Learning
* Applications of ML in real-world scenarios

**Mathematical Foundations**

* Linear Algebra
* Probability & Statistics
* Calculus (Gradient Descent, Optimization)

**Algorithms & Models**

* Linear Regression, Logistic Regression
* Decision Trees, Random Forests
* Support Vector Machines (SVM)
* K-Nearest Neighbors (KNN)
* Naive Bayes
* Clustering: K-Means, Hierarchical
* Dimensionality Reduction: PCA, t-SNE

**Model Evaluation**

* Cross-validation
* Bias-Variance Tradeoff
* Confusion Matrix, Precision, Recall, F1 Score
* ROC-AUC Curve

**Tools & Programming**

* Python (NumPy, Pandas, Scikit-learn)
* Jupyter Notebooks
* Data preprocessing and visualization (Matplotlib, Seaborn)

**Projects & Case Studies**

* Predictive analytics
* Customer segmentation
* Recommendation systems

**Deep Learning Course Syllabus**

**Fundamentals**

* Introduction to Neural Networks
* Perceptron, Activation Functions
* Forward and Backpropagation

**Architectures**

* Feedforward Neural Networks (FNN)
* Convolutional Neural Networks (CNN)
* Recurrent Neural Networks (RNN)
* Long Short-Term Memory (LSTM)
* Transformers (Intro level)

**Advanced Topics**

* Transfer Learning
* Generative Adversarial Networks (GANs)
* Attention Mechanisms
* Autoencoders

**Model Training & Optimization**

* Loss Functions
* Optimizers: SGD, Adam, RMSprop
* Regularization: Dropout, Batch Normalization

**Tools & Frameworks**

* TensorFlow
* Keras

**Projects & Applications**

* Image classification
* Natural Language Processing (NLP)
* Time series forecasting
* Object detection