**180-Day Data Analytics Mastery Program**

*Comprehensive 6-Month curriculum covering Python, SQL, Tableau, Power BI, Advanced Excel & Real-World Projects*

**Month 1: Python Programming Foundation (Days 1-30)**

**Week 1: Python Basics & Environment Setup (Days 1-7)**

**Day 1: Python Introduction & Development Environment**

* Python history, features, and applications
* Installation and setting up development path
* IDE comparison: PyCharm, VS Code, Jupyter
* **Hands-on**: Install Python ecosystem, configure multiple IDEs, create first program

**Day 2: Python Syntax & Basic Operations**

* Python variables, keywords, and identifiers
* Operators (arithmetic, comparison, logical, bitwise)
* Indentation rules and code structure
* **Hands-on**: Build a simple calculator with all operator types

**Day 3: Data Types Deep Dive**

* Basic data types: int, float, string, boolean, complex
* Type conversion and type checking
* Memory management basics
* **Hands-on**: Create type conversion utility and memory usage analyzer

**Day 4: Input/Output & String Manipulation**

* Input/output operations and formatting
* String operations, methods, and formatting
* String slicing and advanced manipulation
* **Hands-on**: Build text processing application with user interaction

**Day 5: Introduction to Data Structures**

* Overview of Python data structures
* When to use which data structure
* Performance considerations
* **Hands-on**: Data structure comparison project

**Day 6: Tuples & Immutable Data**

* Tuple creation, operations, and methods
* Tuple unpacking and packing
* Named tuples introduction
* **Hands-on**: Coordinate system calculator using tuples

**Day 7: Week 1 Review & Mini Project**

* Comprehensive review of Week 1 concepts
* **Hands-on**: Personal information manager using all learned concepts

**Week 2: Data Structures Mastery (Days 8-14)**

**Day 8: Lists - Foundation**

* List creation, indexing, and slicing
* List methods and operations
* List comprehensions basics
* **Hands-on**: Task management system with dynamic lists

**Day 9: Lists - Advanced Operations**

* Nested lists and multi-dimensional data
* List sorting and searching algorithms
* Memory efficiency with lists
* **Hands-on**: Student grade management system with statistics

**Day 10: Dictionaries - Key-Value Programming**

* Dictionary creation and manipulation
* Dictionary methods and operations
* Dictionary comprehensions
* **Hands-on**: Contact management system with search functionality

**Day 11: Sets - Unique Data Management**

* Set operations and methods
* Set theory applications in programming
* Frozen sets and immutability
* **Hands-on**: Data deduplication and analysis tool

**Day 12: Advanced Data Structures**

* Collections module (Counter, defaultdict, OrderedDict)
* Arrays and their applications
* Performance comparison of data structures
* **Hands-on**: Inventory management system using appropriate data structures

**Day 13: Date, Time & Math Operations**

* DateTime module and time manipulation
* Math module functions and constants
* Random number generation and statistics
* **Hands-on**: Event scheduling system with time calculations

**Day 14: Week 2 Review & Integration Project**

* Data structures integration techniques
* **Hands-on**: Library management system combining all data structures

**Week 3: Control Flow & Program Logic (Days 15-21)**

**Day 15: Conditional Logic Mastery**

* if-elif-else structures
* Nested conditions and optimization
* Ternary operators and short-circuit evaluation
* **Hands-on**: Decision tree application for loan approval system

**Day 16: Loop Fundamentals**

* For loops with range, enumerate, zip
* While loops and loop control
* Loop optimization techniques
* **Hands-on**: Pattern generation and mathematical series calculator

**Day 17: Advanced Loop Concepts**

* Break, continue, and pass statements
* Else clauses with loops
* Nested loops and performance considerations
* **Hands-on**: Matrix operations and game board generator

**Day 18: Functions - Foundation**

* Function definition and calling
* Parameters: positional, keyword, default, variable-length
* Return statements and multiple returns
* **Hands-on**: Mathematical utility library creation

**Day 19: Functions - Advanced Concepts**

* Scope: local, global, nonlocal
* Recursion and recursive problem solving
* Function decorators introduction
* **Hands-on**: Recursive algorithms implementation (towers of Hanoi, tree traversal)

**Day 20: Lambda Functions & Functional Programming**

* Lambda expressions and anonymous functions
* Map, filter, reduce functions
* Functional programming concepts
* **Hands-on**: Data transformation pipeline using functional programming

**Day 21: Week 3 Review & Algorithm Project**

* Algorithm design principles
* **Hands-on**: Sorting and searching algorithms implementation and comparison

**Week 4: Modules, Files & Error Handling (Days 22-30)**

**Day 22: Modules & Packages**

* Creating and importing modules
* Package structure and **init**.py
* Module search path and PYTHONPATH
* **Hands-on**: Create personal utility package with documentation

**Day 23: File Operations - Basics**

* File opening, reading, writing, closing
* File modes and context managers
* File pointer manipulation
* **Hands-on**: Log file analyzer with file processing

**Day 24: File Operations - Advanced**

* Working with different file formats
* Binary files and serialization
* File system operations with os module
* **Hands-on**: File organizer and backup utility

**Day 25: Exception Handling Mastery**

* Try-except-finally-else blocks
* Exception hierarchy and custom exceptions
* Debugging techniques and logging
* **Hands-on**: Robust file processor with comprehensive error handling

**Day 26: Object-Oriented Programming - Basics**

* Classes, objects, and methods
* Instance and class variables
* The self keyword and initialization
* **Hands-on**: Bank account management system

**Day 27: OOP - Inheritance & Polymorphism**

* Single and multiple inheritance
* Method overriding and super()
* Polymorphism concepts
* **Hands-on**: Vehicle management system with inheritance hierarchy

**Day 28: OOP - Advanced Concepts**

* Encapsulation and access modifiers
* Abstract classes and interfaces
* Property decorators and getters/setters
* **Hands-on**: Employee management system with access control

**Day 29: System Programming & Threading**

* OS module and system interaction
* Environment variables and path manipulation
* Basic threading and multiprocessing
* **Hands-on**: System monitoring tool with concurrent processing

**Day 30: Month 1 Capstone Project**

* Integration of all Python concepts
* **Hands-on**: Complete web scraper with data processing and storage

**Month 2: Advanced Python & Data Processing (Days 31-60)**

**Week 5: Advanced Python Features (Days 31-37)**

**Day 31: Advanced File & Data Handling**

* CSV module and data processing
* JSON handling and API interaction
* PDF data extraction techniques
* **Hands-on**: Multi-format data converter and processor

**Day 32: Regular Expressions Mastery**

* Pattern matching and searching
* Regex for data validation and cleaning
* Real-time parsing applications
* **Hands-on**: Advanced log analyzer and data validator

**Day 33: Database Connectivity - SQL**

* MySQL connection and CRUD operations
* Database design principles
* SQL query optimization from Python
* **Hands-on**: Customer relationship management system

**Day 34: Database Connectivity - NoSQL**

* MongoDB connection and operations
* Document-based data modeling
* Comparison of SQL vs NoSQL approaches
* **Hands-on**: Product catalog system with MongoDB

**Day 35: XML Processing & Web APIs**

* XML parsing with DOM and SAX
* Working with web APIs and JSON
* Authentication and API rate limiting
* **Hands-on**: News aggregator from multiple API sources

**Day 36: GUI Development with Tkinter**

* Tkinter widgets and layout management
* Event-driven programming
* Creating professional-looking interfaces
* **Hands-on**: Desktop application for data entry and visualization

**Day 37: Network Programming & SMTP**

* Socket programming basics
* Client-server architecture
* Email automation with SMTP
* **Hands-on**: Automated report distribution system

**Week 6: Data Science Libraries - NumPy (Days 38-44)**

**Day 38: NumPy Foundation**

* NumPy arrays vs Python lists
* Array creation methods and properties
* Understanding vectorization benefits
* **Hands-on**: Performance comparison and optimization exercises

**Day 39: Array Operations & Indexing**

* Array indexing, slicing, and fancy indexing
* Boolean indexing and conditional selection
* Array broadcasting concepts
* **Hands-on**: Image processing basics using NumPy arrays

**Day 40: Array Manipulation**

* Shape manipulation: reshape, resize, transpose
* Array joining and splitting operations
* Stack operations and concatenation
* **Hands-on**: Matrix algebra and linear transformations

**Day 41: Mathematical Operations**

* Universal functions (ufuncs)
* Statistical operations and aggregations
* Linear algebra with NumPy
* **Hands-on**: Scientific calculator with matrix operations

**Day 42: Advanced NumPy Features**

* Array iteration and iteration protocols
* Memory layout and performance optimization
* Masked arrays and missing data handling
* **Hands-on**: Time series data analysis with missing value handling

**Day 43: NumPy for Data Analysis**

* Sorting and searching operations
* Array filtering and condition-based operations
* Random number generation and sampling
* **Hands-on**: Monte Carlo simulation project

**Day 44: Week 6 Review & NumPy Project**

* Integration of all NumPy concepts
* **Hands-on**: Financial portfolio analysis tool

**Week 7: Data Science Libraries - Pandas (Days 45-51)**

**Day 45: Pandas Foundation**

* Series and DataFrame fundamentals
* Index objects and data alignment
* Data types and memory optimization
* **Hands-on**: Sales data exploration and basic analysis

**Day 46: Data Import & Export**

* Reading various file formats (CSV, Excel, JSON, SQL)
* Handling different encodings and separators
* Writing data to different formats
* **Hands-on**: Multi-source data integration pipeline

**Day 47: Data Cleaning & Preparation**

* Handling missing data strategies
* Data type conversions and validation
* Duplicate detection and removal
* **Hands-on**: Real-world messy dataset cleaning project

**Day 48: Data Selection & Filtering**

* Boolean indexing and query methods
* loc and iloc for precise selection
* Multi-level indexing and hierarchical data
* **Hands-on**: Customer segmentation analysis

**Day 49: Data Transformation**

* Apply functions and lambda operations
* String operations and text processing
* Date/time manipulation and parsing
* **Hands-on**: E-commerce transaction analysis

**Day 50: Data Aggregation & Grouping**

* GroupBy operations and aggregations
* Pivot tables and cross-tabulations
* Merge, join, and concatenate operations
* **Hands-on**: Comprehensive sales performance dashboard data preparation

**Day 51: Advanced Pandas Features**

* Time series analysis capabilities
* Categorical data handling
* Performance optimization techniques
* **Hands-on**: Stock market data analysis project

**Week 8: Data Visualization & Web Development (Days 52-60)**

**Day 52: Matplotlib Foundation**

* Plotting basics and figure/axes concepts
* Line plots, scatter plots, and customization
* Colors, markers, and styling options
* **Hands-on**: Scientific data visualization suite

**Day 53: Advanced Matplotlib**

* Subplots and complex layouts
* Bar charts, histograms, and statistical plots
* 3D plotting capabilities
* **Hands-on**: Multi-dimensional data exploration tool

**Day 54: Seaborn for Statistical Visualization**

* Statistical plotting with Seaborn
* Distribution plots and relationship visualization
* Categorical data visualization
* **Hands-on**: Exploratory data analysis dashboard

**Day 55: Interactive Visualization**

* Plotly basics for interactive charts
* Dashboard creation concepts
* Web-based visualization deployment
* **Hands-on**: Interactive business intelligence dashboard

**Day 56: Web Development with Django - Setup**

* Django framework introduction
* MVC architecture understanding
* Project structure and configuration
* **Hands-on**: Data analytics web application foundation

**Day 57: Django Models & Database**

* Model definition and database integration
* Django ORM for data operations
* Admin interface for data management
* **Hands-on**: Data management web interface

**Day 58: Django Views & Templates**

* View functions and class-based views
* Template system and data presentation
* Static files and media handling
* **Hands-on**: Web-based data visualization platform

**Day 59: Django Integration & Deployment**

* Integrating data analysis with web interface
* API development for data services
* Basic deployment concepts
* **Hands-on**: Complete data analytics web application

**Day 60: Month 2 Capstone Project**

* Full-stack data analytics application
* **Hands-on**: End-to-end data pipeline with web interface

**Month 3: Business Intelligence Tools Mastery (Days 61-90)**

**Week 9: Tableau Foundation (Days 61-67)**

**Day 61: Business Intelligence & Tableau Introduction**

* BI concepts and data visualization principles
* Tableau ecosystem and architecture
* Installation and interface exploration
* **Hands-on**: Environment setup and first visualization

**Day 62: Data Connections & Sources**

* Various data source connections
* Live connections vs extracts
* Data source optimization strategies
* **Hands-on**: Multi-source data connection project

**Day 63: Data Preparation in Tableau**

* Data interpreter and data preparation
* Union, join, and blend operations
* Data quality assessment
* **Hands-on**: Complex data integration scenario

**Day 64: Basic Visualizations**

* Fundamental chart types
* Marks card and visual encoding
* Show Me feature and best practices
* **Hands-on**: Comprehensive chart type exploration

**Day 65: Calculations & Fields**

* Calculated fields creation
* Table calculations fundamentals
* Parameters and their applications
* **Hands-on**: Dynamic KPI calculator

**Day 66: Filters & Interactivity**

* Filter types and hierarchy
* Quick filters and cascading filters
* Actions and dashboard interactivity
* **Hands-on**: Interactive filtering system

**Day 67: Week 9 Review & Basic Dashboard**

* Dashboard design principles
* **Hands-on**: Sales performance dashboard

**Week 10: Advanced Tableau Features (Days 68-74)**

**Day 68: Advanced Chart Types**

* Waterfall, bullet, and Gantt charts
* Box plots and statistical visualizations
* Custom chart development
* **Hands-on**: Executive reporting suite

**Day 69: Geographic Mapping**

* Map creation and customization
* Geocoding and spatial analysis
* Custom territories and regions
* **Hands-on**: Geographic sales analysis

**Day 70: Statistical Analysis in Tableau**

* Trend lines and forecasting
* Reference lines and bands
* Statistical functions and distributions
* **Hands-on**: Predictive analytics dashboard

**Day 71: Advanced Calculations**

* Level of detail (LOD) expressions
* Window functions and ranking
* Complex calculation scenarios
* **Hands-on**: Advanced business metrics calculator

**Day 72: Dashboard Design Excellence**

* Design principles and best practices
* Mobile optimization and responsiveness
* Performance optimization
* **Hands-on**: Professional executive dashboard

**Day 73: Tableau Server & Collaboration**

* Publishing and sharing workbooks
* User permissions and security
* Collaboration features
* **Hands-on**: Multi-user dashboard deployment

**Day 74: Tableau Integration & Automation**

* API integration and automation
* R and Python integration
* Advanced data connectivity
* **Hands-on**: Automated reporting system

**Week 11: Power BI Mastery (Days 75-81)**

**Day 75: Power BI Ecosystem**

* Power BI components and architecture
* Comparison with other BI tools
* Licensing and deployment options
* **Hands-on**: Power BI environment setup and exploration

**Day 76: Data Modeling in Power BI**

* Data model design principles
* Relationships and cardinality
* Star schema and data warehouse concepts
* **Hands-on**: Enterprise data model creation

**Day 77: DAX Language Foundation**

* DAX syntax and functions
* Calculated columns vs measures
* Context and evaluation concepts
* **Hands-on**: Advanced business calculations with DAX

**Day 78: Advanced DAX & Time Intelligence**

* Time intelligence functions
* Complex DAX patterns
* Performance optimization
* **Hands-on**: Financial reporting with time-based calculations

**Day 79: Power BI Visualizations**

* Built-in and custom visuals
* Visual formatting and design
* Mobile layout optimization
* **Hands-on**: Comprehensive visualization suite

**Day 80: Power BI Service & Collaboration**

* Publishing to Power BI Service
* Workspaces and app creation
* Sharing and security management
* **Hands-on**: Enterprise BI solution deployment

**Day 81: Power BI Integration & Advanced Features**

* Power Automate integration
* Real-time data and streaming
* AI and machine learning features
* **Hands-on**: Intelligent business analytics solution

**Week 12: Advanced Excel & Integration (Days 82-90)**

**Day 82: Advanced Excel Functions**

* Complex formulas and array functions
* Financial and statistical functions
* Lookup functions mastery
* **Hands-on**: Financial modeling project

**Day 83: Excel Data Analysis Tools**

* Pivot tables advanced features
* Power Query for data transformation
* What-if analysis and scenario planning
* **Hands-on**: Business scenario analysis tool

**Day 84: Excel Automation with VBA**

* VBA programming fundamentals
* Macro creation and optimization
* User form development
* **Hands-on**: Automated reporting system

**Day 85: Power BI & Excel Integration**

* Excel and Power BI connectivity
* Power Pivot and data modeling
* Collaborative analytics workflows
* **Hands-on**: Integrated analytics solution

**Day 86: Data Visualization Excellence**

* Advanced charting techniques
* Interactive dashboard creation
* Design principles application
* **Hands-on**: Executive dashboard suite

**Day 87: Performance & Optimization**

* File size optimization
* Calculation performance tuning
* Best practices implementation
* **Hands-on**: High-performance analytics workbook

**Day 88: Integration Testing**

* Cross-platform data validation
* Automated testing procedures
* Quality assurance protocols
* **Hands-on**: Complete integration testing suite

**Day 89: Documentation & Training**

* User manual creation
* Training material development
* Knowledge transfer protocols
* **Hands-on**: Comprehensive documentation package

**Day 90: Month 3 Portfolio Project**

* Complete BI solution development
* **Hands-on**: End-to-end business intelligence system

**Month 4: Database Management & SQL Mastery (Days 91-120)**

**Week 13: SQL Fundamentals (Days 91-97)**

**Day 91: Database Concepts & MySQL Setup**

* Relational database theory
* ACID properties and normalization
* MySQL installation and configuration
* **Hands-on**: Database server setup and security configuration

**Day 92: Database Design & Schema Creation**

* ER diagrams and database design
* Data types and constraints
* Primary keys, foreign keys, and indexes
* **Hands-on**: E-commerce database design project

**Day 93: Basic SQL Operations - DDL**

* CREATE, ALTER, DROP statements
* Database and table management
* Index creation and optimization
* **Hands-on**: Company database structure implementation

**Day 94: Data Manipulation Language - DML**

* INSERT, UPDATE, DELETE operations
* Bulk operations and transactions
* Data integrity and constraints
* **Hands-on**: Employee management system data operations

**Day 95: Data Query Language - SELECT Mastery**

* SELECT statement variations
* WHERE clause and filtering
* Sorting and limiting results
* **Hands-on**: Customer data analysis queries

**Day 96: Advanced Filtering & Patterns**

* LIKE operator and wildcards
* IN, BETWEEN, and NULL handling
* Regular expressions in SQL
* **Hands-on**: Product search and filtering system

**Day 97: Week 13 Review & Practice**

* Query optimization basics
* **Hands-on**: Comprehensive database query challenge

**Week 14: Advanced SQL Operations (Days 98-104)**

**Day 98: Aggregate Functions & Grouping**

* COUNT, SUM, AVG, MIN, MAX functions
* GROUP BY and HAVING clauses
* Statistical analysis with SQL
* **Hands-on**: Sales performance analysis system

**Day 99: Joins & Relationships**

* INNER, LEFT, RIGHT, FULL OUTER joins
* Self joins and cross joins
* Multiple table query strategies
* **Hands-on**: Complex relational data analysis

**Day 100: Subqueries & Derived Tables**

* Correlated and non-correlated subqueries
* EXISTS and IN with subqueries
* Common table expressions (CTEs)
* **Hands-on**: Hierarchical data analysis project

**Day 101: Advanced SQL Functions**

* String functions and manipulation
* Date/time functions and calculations
* Mathematical and conversion functions
* **Hands-on**: Data transformation and cleaning procedures

**Day 102: Window Functions & Analytics**

* ROW\_NUMBER, RANK, DENSE\_RANK
* LAG, LEAD, and running totals
* Partitioning and frame clauses
* **Hands-on**: Time series analysis with SQL

**Day 103: Stored Procedures & Functions**

* Procedure creation and parameters
* Control flow statements
* Error handling in procedures
* **Hands-on**: Business logic implementation in database

**Day 104: Database Administration Basics**

* User management and permissions
* Backup and recovery procedures
* Performance monitoring
* **Hands-on**: Database administration task automation

**Week 15: Advanced Database Concepts (Days 105-111)**

**Day 105: Database Performance Tuning**

* Query execution plan analysis
* Index optimization strategies
* Query rewriting techniques
* **Hands-on**: Performance optimization project

**Day 106: Views & Data Security**

* View creation and management
* Updatable views and restrictions
* Data security and access control
* **Hands-on**: Secure data access layer implementation

**Day 107: Triggers & Automation**

* Trigger types and applications
* Audit trail implementation
* Automated data validation
* **Hands-on**: Automated business rule enforcement

**Day 108: Advanced Data Types**

* JSON data handling in MySQL
* BLOB and text data management
* Spatial data and GIS integration
* **Hands-on**: Multi-media data management system

**Day 109: Database Integration**

* ETL processes with SQL
* Data warehousing concepts
* Database replication basics
* **Hands-on**: Data warehouse implementation

**Day 110: NoSQL Introduction**

* MongoDB basics and document model
* NoSQL vs SQL comparison
* Hybrid database architectures
* **Hands-on**: Multi-database integration project

**Day 111: Week 15 Review & Advanced Project**

* Complex database solution design
* **Hands-on**: Enterprise database system implementation

**Week 16: MS Access & Database Applications (Days 112-120)**

**Day 112: MS Access Foundation**

* Access database structure
* Table design and relationships
* Data import/export capabilities
* **Hands-on**: Small business database creation

**Day 113: Access Queries & Reports**

* Query design interface
* Report creation and formatting
* Label and form generation
* **Hands-on**: Customer relationship management system

**Day 114: Access Forms & User Interface**

* Form design and controls
* Navigation and user experience
* Data validation and input masks
* **Hands-on**: User-friendly data entry system

**Day 115: Access VBA Programming**

* VBA basics in Access environment
* Event-driven programming
* Form and report automation
* **Hands-on**: Automated business process application

**Day 116: Access-Excel Integration**

* Data exchange between platforms
* Linked tables and external data
* Automated reporting workflows
* **Hands-on**: Integrated office automation system

**Day 117: Access Database Administration**

* Security and user permissions
* Database splitting and networking
* Maintenance and optimization
* **Hands-on**: Multi-user database deployment

**Day 118: Web Database Integration**

* SharePoint integration basics
* Web forms and data collection
* Cloud database connectivity
* **Hands-on**: Web-integrated database solution

**Day 119: Database Project Management**

* Version control for databases
* Documentation standards
* Change management procedures
* **Hands-on**: Professional database project delivery

**Day 120: Month 4 Capstone Project**

* Complete database solution
* **Hands-on**: Enterprise-level database system with web interface

**Month 5: Advanced Analytics & Machine Learning (Days 121-150)**

**Week 17: Advanced Data Analysis (Days 121-127)**

**Day 121: Statistical Analysis Foundation**

* Descriptive vs inferential statistics
* Probability distributions
* Hypothesis testing concepts
* **Hands-on**: Statistical analysis toolkit development

**Day 122: Exploratory Data Analysis (EDA)**

* Data profiling and quality assessment
* Correlation analysis and feature relationships
* Outlier detection and treatment
* **Hands-on**: Comprehensive EDA framework

**Day 123: Time Series Analysis**

* Time series components and decomposition
* Trend analysis and seasonality
* Moving averages and smoothing
* **Hands-on**: Sales forecasting system

**Day 124: Advanced Statistical Methods**

* Regression analysis fundamentals
* ANOVA and chi-square tests
* Non-parametric statistical methods
* **Hands-on**: Marketing effectiveness analysis

**Day 125: Introduction to Machine Learning**

* ML concepts and algorithm types
* Supervised vs unsupervised learning
* Model evaluation metrics
* **Hands-on**: Customer classification project

**Day 126: Scikit-learn Foundation**

* Library overview and installation
* Data preprocessing techniques
* Model selection and validation
* **Hands-on**: Predictive modeling pipeline

**Day 127: Week 17 Review & ML Project**

* Integration of statistical and ML concepts
* **Hands-on**: Comprehensive predictive analytics solution

**Week 18: Machine Learning Applications (Days 128-134)**

**Day 128: Classification Algorithms**

* Decision trees and random forests
* Support vector machines
* Naive Bayes and logistic regression
* **Hands-on**: Customer churn prediction system

**Day 129: Regression Analysis**

* Linear and polynomial regression
* Ridge and Lasso regularization
* Feature selection techniques
* **Hands-on**: Price prediction model

**Day 130: Clustering & Unsupervised Learning**

* K-means and hierarchical clustering
* DBSCAN and density-based clustering
* Principal component analysis (PCA)
* **Hands-on**: Customer segmentation analysis

**Day 131: Model Optimization**

* Hyperparameter tuning techniques
* Cross-validation strategies
* Grid search and random search
* **Hands-on**: Model performance optimization

**Day 132: Ensemble Methods**

* Bagging and boosting concepts
* Random forest and gradient boosting
* Voting and stacking techniques
* **Hands-on**: Advanced prediction system

**Day 133: Natural Language Processing Basics**

* Text preprocessing and tokenization
* TF-IDF and word embeddings
* Sentiment analysis applications
* **Hands-on**: Customer feedback analysis system

**Day 134: Deep Learning Introduction**

* Neural network basics
* TensorFlow and Keras introduction
* Simple neural network implementation
* **Hands-on**: Image classification project

**Week 19: Advanced Visualization & Reporting (Days 135-141)**

**Day 135: Advanced Data Storytelling**

* Narrative structure in data presentation
* Visual hierarchy and design principles
* Audience-specific communication
* **Hands-on**: Executive presentation development

**Day 136: Interactive Dashboard Development**

* Dash and Streamlit frameworks
* Real-time data integration
* User interaction design
* **Hands-on**: Interactive ML model demonstration

**Day 137: Automated Reporting Systems**

* Report generation automation
* Email integration and scheduling
* Template-based reporting
* **Hands-on**: Automated business intelligence system

**Day 138: Advanced Excel for Analytics**

* Power Query advanced features
* Data model optimization
* Custom functions and formulas
* **Hands-on**: Self-service analytics workbook

**Day 139: Business Intelligence Integration**

* Multi-platform data integration
* Real-time dashboard updates
* Mobile-responsive design
* **Hands-on**: Enterprise BI solution

**Day 140: Data Quality & Governance**

* Data quality assessment frameworks
* Data lineage and documentation
* Governance policies implementation
* **Hands-on**: Data quality monitoring system

**Day 141: Week 19 Review & Integration**

* Advanced analytics workflow optimization
* **Hands-on**: Complete analytics platform development

**Week 20: Industry Applications & Case Studies (Days 142-150)**

**Day 142: Financial Analytics**

* Risk assessment and modeling
* Portfolio optimization techniques
* Fraud detection systems
* **Hands-on**: Financial risk analysis dashboard

**Day 143: Marketing Analytics**

* Customer lifetime value modeling
* Attribution analysis
* A/B testing frameworks
* **Hands-on**: Marketing campaign optimization system

**Day 144: Healthcare Analytics**

* Medical data analysis considerations
* Predictive modeling for healthcare
* Privacy and compliance requirements
* **Hands-on**: Patient outcome prediction system

**Day 145: Retail & E-commerce Analytics**

* Recommendation systems
* Inventory optimization
* Price elasticity analysis
* **Hands-on**: E-commerce analytics platform

**Day 146: Supply Chain Analytics**

* Demand forecasting
* Inventory optimization
* Supplier performance analysis
* **Hands-on**: Supply chain optimization dashboard

**Day 147: HR Analytics**

* Employee performance analysis
* Turnover prediction modeling
* Recruitment optimization
* **Hands-on**: HR analytics and reporting system

**Day 148: Social Media & Web Analytics**

* Social media sentiment analysis
* Web traffic analysis
* Conversion funnel optimization
* **Hands-on**: Digital marketing analytics platform

**Day 149: IoT & Sensor Data Analytics**

* Time series data from sensors
* Anomaly detection systems
* Predictive maintenance modeling
* **Hands-on**: IoT data analytics solution

**Day 150: Month 5 Capstone Project**

* Industry-specific analytics solution
* **Hands-on**: Complete end-to-end analytics platform for chosen industry

**Month 6: Professional Development & Portfolio (Days 151-180)**

**Day 151: Python Certification - PCEP Preparation**

* PCEP-30-xx exam structure and topics
* Practice tests and mock examinations
* Code review and optimization techniques
* **Hands-on**: Intensive coding practice sessions

**Day 152: Python Certification - PCAP Preparation**

* PCAP-31-xx advanced concepts
* Object-oriented programming mastery
* Advanced Python features review
* **Hands-on**: Advanced Python project development

**Day 153: Python Certification - PCPP Preparation**

* PCPP-32-1xx and PCPP-32-2xx preparation
* Professional Python development practices
* Code quality and testing frameworks
* **Hands-on**: Professional-grade Python application

**Day 154: SQL Certification Preparation**

* MySQL certification concepts
* Advanced query optimization
* Database administration skills
* **Hands-on**: Comprehensive database project

**Day 155: Microsoft Certification Preparation**

* Power BI and Excel certifications
* Microsoft Data Analyst path
* Azure fundamentals for data
* **Hands-on**: Microsoft ecosystem integration project

**Day 156: Tableau Certification Preparation**

* Tableau Desktop Specialist preparation
* Advanced visualization techniques
* Best practices and optimization
* **Hands-on**: Professional Tableau portfolio development

**Day 157: Week 21 Review & Mock Examinations**

* Comprehensive certification review
* **Hands-on**: Full-scale mock examination sessions

**Week 22: Professional Portfolio Development (Days 158-164)**

**Day 158: Portfolio Planning & Structure**

* Professional portfolio requirements
* Project selection and organization
* Personal branding for data professionals
* **Hands-on**: Portfolio website structure development

**Day 159: Project Documentation**

* Technical documentation best practices
* Code documentation and commenting
* Project presentation techniques
* **Hands-on**: Professional project documentation creation

**Day 160: GitHub & Version Control**

* Git fundamentals and best practices
* GitHub portfolio optimization
* Collaborative development workflows
* **Hands-on**: GitHub portfolio setup and optimization

**Day 161: Resume & LinkedIn Optimization**

* Data analyst resume best practices
* LinkedIn profile optimization
* Professional networking strategies
* **Hands-on**: Professional profile development

**Day 162: Interview Preparation**

* Technical interview preparation
* Behavioral interview strategies
* Portfolio presentation skills
* **Hands-on**: Mock interview sessions

**Day 163: Freelancing & Consulting**

* Independent consulting preparation
* Project pricing and proposals
* Client communication skills
* **Hands-on**: Freelance project proposal development

**Day 164: Career Path Planning**

* Data career progression paths
* Skill gap analysis and development
* Continuous learning strategies
* **Hands-on**: Personal career development plan

**Week 23: Advanced Integration Projects (Days 165-171)**

**Day 165: End-to-End Data Pipeline**

* Complete data pipeline architecture
* ETL/ELT process implementation
* Data quality and monitoring
* **Hands-on**: Automated data pipeline development

\*\*