Computer Science Basics - Algorithms

Topic Name	Topic Description	Duration (Instruction Hours)	Recommended Reading	Website References	Assignments / Challenges / Mini Project Ideas	Assignment Working Hours
Introduction to CS	CS, Computer Organisation, Computer Architecture		How to think like a computer scientist in Python	https://www.cs.hmc.edu/csforall/ https://cs50.harvard.edu	Given in the Website References	
Fundamentals of Writing Software Programs	Programming mindset, Solving and converting real world problems to programs, how programs run in Computer / Memory		How to think like a computer scientist in Python	https://www.cs.hmc.edu/csforall/ https://cs50.harvard.edu	Given in the Website References	
Writing Quality Software	Writing Quality Software Programs		Code Complete	https://www.python.org/dev/peps/pep-0008/		
Linux / Bash / POSIX	Linux, Bash Programming Environment, and POSIX		Shell Intro, Bash Cookbook, Classic Shell Scripting	http://www.thegeekstuff.com/2010/11/50-linux-commands/?utm_source=feedburner	http://www.codequizzes.com/bash	
Git and GitHub	Git Workflow		Introduction to GitHub - Oreilly Publications			
Introduction to Algorithms	Algorithms, Big O Notation		1. Introduction to Algorithms 2. Data Structures and Algorithms in Python	1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-introduction-to-algorithms-sma-5503-fall-2005/index.htm		
Types of Algorithms	Greedy, Divide and Conquer		1. Introduction to Algorithms 2. Data Structures and Algorithms in Python	1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-introduction-to-algorithms-sma-5503-fall-2005/index.htm		
Data Structures	Linked Lists, Queues, Arrays, Stacks, Deques, Hash Tables, Trees		1. Introduction to Algorithms 2. Data Structures and Algorithms in Python	1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-introduction-to-algorithms-sma-5503-fall-2005/index.htm		

Development Environment, Introduction to CS and Programming

Topic Name	Topic Description	Duration (Instruction Hours)	Recommended Books for Reading	Website References	Assignments / Challenges / Mini Project Ideas	Assignment Work Duration
Introduction to Python	Python Introduction, programming language concepts, Assignments, Variables, Expressions	2 Hours	1. Core Python Programming 2nd Ed (Chapters 2,3,4,5) 2. Learning Python (Chapters 4,5,6,7) 3. Thinking Python (Chapter 2)	docs.python.org	1. bytedev.co 2. Chapter End Exercises	6 Hours
Python Data Structures,	Sequences, Lists, Tuples, Dicts, Sets	2 Hours	1. Core Python Programming 2nd Ed (Chapters 6,7) 2. Learning Python (Chapters 8,9)	docs.python.org	1. bytedev.co 2. Chapter End Exercises	6 Hours
Python Control Flows, File Operations	If then else, while, for, File operations	2 Hours	1. Core Python Programming 2nd Ed (Chapters 8,9) 2. Learning Python (Chapters 9, 12, 13)	docs.python.org	1. bytedev.co 2. Chapter End Exercises	6 Hours
Python Functions, Functional Programming	Functions, Iterators, Generators	2 Hours	1. Core Python Programming 2nd Ed (Chapters 11) 2. Learning Python (Chapters 14,15, 16, 17, 18,19,20)	docs.python.org	1. bytedev.co 2. Chapter End Exercises	6 Hours
Python Modules and Modular Programming, Standard Library Reference						
Python Object Oriented Programming						
Python Metaprogramming						
Python Network Programming						
Python Data encoding and decoding						
Design Patterns in Python (MVC)						

Table 1

Topic Name	Topic Description	Duration (Instruction Hours)	Recommended Reading	Website References	Assignments / Challenges / Mini Project Ideas	Assignment Work Duration
Introduction to Java Script						
Java Script Data Structures						
Java Script Functions						

Table 1

Topic Name	Topic Description	Duration (Instruction Hours)	Recommended Reading	Website References	Assignments / Challenges / Mini Project Ideas	Assignments Submission Duration
Introduction to Databases						
Introduction to Relational and Non Relational Database Management System						
Introduction to SQL						
SQL Relationships and Schemas						
CRUD Operations	Create / Read / Update / Delete Operations					
Import / Export to Different Data Formats	JSON, XML, CSV					
Relational Database Management Systems	SQLite3, MySQL, Postgres SQL					
Non Relational Database Management Systems	Mongo DB, Redis					
Object Relational Mappers						
SQL Injections						
ETL Concepts						

Table 1

Topic Name	Topic Description	Duration (Instruction Duration)	Recommended Reading	Website References	Assignments / Challenges / Mini Project Ideas	Assignment Submission Duration
Introduction to Web Development	DOM, Event Listeners, Java Script Scope					
HTTP Verbs						
Front End Development	HTML, CSS, CSS Specificity, Pseudo Classes, CSS Positioning JavaScript, Chrome Dev Tools			Mozilla Developer Network Resources		
Javascript Web Development Frameworks	Java Script, jQuery, Angular JS, Node JS, React JS, Express					
Python Web Development Frameworks	Flask, Django					
Back End Development	AJAX, RESTful APIs, Password Hashing, User Sessions,					
	SSH, Nginx, LAMP Stack, Firewalls, GlusterFS					

Table 1

Topic Name	Topic Description	Duration (Instruction Duration)	Recommended Reading	Website References	Assignments / Challenges / Mini Project Ideas	Assignment Submission Duration
Introduction to Distributed Computing Systems	Monolithic Architecture, Fault Tolerance, Microservice Architecture					
Introduction to Cluster Computing						
Hadoop						
Spark						
Cloud Computing Platforms	Digital Ocean, AWS, Azure, Google Cloud Compute					

Table 1

Topic Name	Topic Description	Duration (Instruction Hours)	Recommended Reading	Website References	Assignments / Challenges / Mini Project Ideas	Assignment Working Hours