uCertify

Course Outline

The Self-Taught Computer Scientist: The Beginner's Guide to Data Structures & Algorithms

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1. Course Objective

Enhance your programming skills with The Self-Taught Computer Scientist: The Beginner's Guide to Data Structures & Algorithms course. Master computer science, data structures, and algorithms to solve complex problems and propel your career to new heights. Start a transformative learning journey with real-life examples that yield tangible outcomes. It contains interactive lessons, quizzes, and hands-on labs to build and iterate on your code like a software developer.

2. Pre-Assessment

Pre-Assessment lets you identify the areas for improvement before you start your prep. It determines what students know about a topic before it is taught and identifies areas for improvement with question assessment before beginning the course.

3. Exercises

There is no limit to the number of times learners can attempt these. Exercises come with detailed remediation, which ensures that learners are confident on the topic before proceeding.

4. Quiz

Quizzes test your knowledge on the topics of the exam when you go through the course material. There is no limit to the number of times you can attempt it.

5. flashcards

Flashcards are effective memory-aiding tools that help you learn complex topics easily. The flashcard will help you in memorizing definitions, terminologies, key concepts, and more. There is no limit to the number of times learners can attempt these. Flashcards help master the key concepts.

6. Glossary of terms

uCertify provides detailed explanations of concepts relevant to the course through Glossary. It contains a list of frequently used terminologies along with its detailed explanation. Glossary defines the key terms.

7. Expert Instructor-Led Training

uCertify uses the content from the finest publishers and only the IT industry's finest instructors. They have a minimum of 15 years real-world experience and are subject matter experts in their fields. Unlike a live class, you can study at your own pace. This creates a personal learning experience and gives you all the benefit of hands-on training with the flexibility of doing it around your schedule 24/7.

8. ADA Compliant & JAWS Compatible Platform

uCertify course and labs are ADA (Americans with Disability Act) compliant. It is now more accessible to students with features such as:

- Change the font, size, and color of the content of the course
- Text-to-speech, reads the text into spoken words
- Interactive videos, how-tos videos come with transcripts and voice-over
- Interactive transcripts, each word is clickable. Students can clip a specific part of the video by clicking on a word or a portion of the text.

JAWS (Job Access with Speech) is a computer screen reader program for Microsoft Windows that reads the screen either with a text-to-speech output or by a Refreshable Braille display. Student can easily navigate uCertify course using JAWS shortcut keys.

9. State of the Art Educator Tools

uCertify knows the importance of instructors and provide tools to help them do their job effectively. Instructors are able to clone and customize course. Do ability grouping. Create sections. Design grade scale and grade formula. Create and schedule assessments. Educators can also move a student from self-paced to mentor-guided to instructor-led mode in three clicks.

10. Award Winning Learning Platform (LMS)

uCertify has developed an award winning, highly interactive yet simple to use platform. The SIIA CODiE Awards is the only peer-reviewed program to showcase business and education technology's finest products and services. Since 1986, thousands of products, services and solutions have been

recognized for achieving excellence. uCertify has won CODiE awards consecutively for last 7 years:

- **2014**
    1. Best Postsecondary Learning Solution

- **2015**
    1. Best Education Solution
    2. Best Virtual Learning Solution
    3. Best Student Assessment Solution
    4. Best Postsecondary Learning Solution
    5. Best Career and Workforce Readiness Solution
    6. Best Instructional Solution in Other Curriculum Areas
    7. Best Corporate Learning/Workforce Development Solution

- **2016**
    1. Best Virtual Learning Solution
    2. Best Education Cloud-based Solution
    3. Best College and Career Readiness Solution
    4. Best Corporate / Workforce Learning Solution
    5. Best Postsecondary Learning Content Solution
    6. Best Postsecondary LMS or Learning Platform
    7. Best Learning Relationship Management Solution

- **2017**
    1. Best Overall Education Solution
    2. Best Student Assessment Solution
    3. Best Corporate/Workforce Learning Solution
    4. Best Higher Education LMS or Learning Platform

- **2018**
    1. Best Higher Education LMS or Learning Platform

2. Best Instructional Solution in Other Curriculum Areas
3. Best Learning Relationship Management Solution

- **2019**
  1. Best Virtual Learning Solution
  2. Best Content Authoring Development or Curation Solution
  3. Best Higher Education Learning Management Solution (LMS)

- **2020**
  1. Best College and Career Readiness Solution
  2. Best Cross-Curricular Solution
  3. Best Virtual Learning Solution

11. Chapter & Lessons

uCertify brings these textbooks to life. It is full of interactive activities that keeps the learner engaged. uCertify brings all available learning resources for a topic in one place so that the learner can efficiently learn without going to multiple places. Challenge questions are also embedded in the chapters so learners can attempt those while they are learning about that particular topic. This helps them grasp the concepts better because they can go over it again right away which improves learning.

Learners can do Flashcards, Exercises, Quizzes and Labs related to each chapter. At the end of every lesson, uCertify courses guide the learners on the path they should follow.

Syllabus

Chapter 1: Introduction

- What You Will Learn
- Who Is This Course For?
- Self-Taught Success Stories

- Getting Started
- Sticking with It

Chapter 2: What Is an Algorithm

- Analyzing Algorithms
- Constant Time
- Logarithmic Time
- Linear Time
- Log-Linear Time
- Quadratic Time
- Cubic Time
- Exponential Time
- Best-Case vs. Worst-Case Complexity
- Space Complexity
- Why Is This Important?
- Challenge

Chapter 3: Recursion

- When to Use Recursion
- Challenge

Chapter 4: Search Algorithms

- Linear Search
- When to Use a Linear Search
- Binary Search
- When to Use a Binary Search
- Searching for Characters
- Challenge

Chapter 5: Sorting Algorithms

- Bubble Sort
- When to Use Bubble Sort
- Insertion Sort
- When to Use Insertion Sort
- Merge Sort
- When to Use Merge Sort
- Sorting Algorithms in Python

- Challenge

Chapter 6: String Algorithms

- Anagram Detection
- Palindrome Detection
- Last Digit
- Caesar Cipher
- Challenge

Chapter 7: Math

- Binary
- Bitwise Operators
- FizzBuzz
- Greatest Common Factor
- Euclid's Algorithm
- Primes
- Challenge

Chapter 8: Self-Taught Inspiration: Margaret Hamilton

Chapter 9: What Is a Data Structure

- Data Structure and its Types
- Challenge

Chapter 10: Arrays

- Array Performance
- Creating an Array
- Moving Zeros
- Combining Two Lists
- Finding the Duplicates in a List
- Finding the Intersection of Two Lists
- Challenge

Chapter 11: Linked Lists

- Linked List Performance
- Create a Linked List
- Search a Linked List
- Removing a Node from a Linked List

- Finding a Linked List Cycle
- Challenges

Chapter 12: Stacks

- When to Use Stacks
- Creating a Stack
- Using Stacks to Reverse Strings
- Min Stack
- Stacked Parentheses
- Challenges

Chapter 13: Queues

- When to Use Queues
- Creating a Queue
- Python's Built-In Queue Class
- Create a Queue Using Two Stacks
- Challenge

Chapter 14: Hash Tables

- When to Use Hash Tables
- Characters in a String
- Two Sum
- Challenge

Chapter 15: Binary Trees

- When to Use Trees
- Creating a Binary Tree
- Breadth-First Tree Traversal
- More Tree Traversals
- Invert a Binary Tree
- Challenges

Chapter 16: Binary Heaps

- When to Use Heaps
- Creating a Heap
- Connecting Ropes with Minimal Cost
- Challenge

Chapter 17: Graphs

- When to Use Graphs
- Creating a Graph
- Dijkstra's Algorithm
- Challenge

Chapter 18: Self-Taught Inspiration: Elon Musk

Chapter 19: Next Steps

- What’s Next?
- Climbing the Freelance Ladder
- How to Get an Interview
- How to Prepare for a Technical Interview
- Additional Resources
- Final Thoughts

12. Practice Test

Here's what you get

52	52
PRE-ASSESSMENTS QUESTIONS	POST-ASSESSMENTS QUESTIONS

Features

Each question comes with detailed remediation explaining not only why an answer option is correct but also why it is incorrect.

Unlimited Practice

Each test can be taken unlimited number of times until the learner feels they are prepared. Learner can review the test and read detailed remediation. Detailed test history is also available.

Each test set comes with learn, test and review modes. In learn mode, learners will attempt a question and will get immediate feedback and complete remediation as they move on to the next question. In test mode, learners can take a timed test simulating the actual exam conditions. In review mode, learners can read through one item at a time without attempting it.

13. Performance Based Labs

uCertify's performance-based labs are simulators that provides virtual environment. Labs deliver hands on experience with minimal risk and thus replace expensive physical labs. uCertify Labs are cloud-based, device-enabled and can be easily integrated with an LMS. Features of uCertify labs:

- Provide hands-on experience in a safe, online environment
- Labs simulate real world, hardware, software & CLI environment
- Flexible and inexpensive alternative to physical Labs
- Comes with well-organized component library for every task
- Highly interactive - learn by doing
- Explanations and remediation available
- Videos on how to perform

Lab Tasks

- Iterating Through a List
- Printing the Numbers Recursively
- Calculating the Factorial of a Number Recursively
- Performing a Linear Search
- Performing a Binary Search
- Using a Bubble Sort Algorithm
- Using an Insertion Sort Algorithm
- Determining Anagrams
- Determining a Palindrome
- Implementing FizzBuzz
- Finding the Greatest Common Factor of Two Numbers
- Determining a Prime Number
- Locating All the Zeros to the End of a List
- Combining Two Lists
- Creating a Linked List
- Finding a Linked List Cycle
- Tracking Stack's Biggest Number
- Using Stacked Parentheses
- Creating a Queue Using Two Stacks
- Removing All Duplicate Words
- Counting All the Characters in a String
- Using a Breadth-First Search
- Inverting a Binary Tree
- Creating a Heap
- Implementing Dijkstra's Algorithm

Here's what you get

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PERFORMANCE BASED LAB

14. Post-Assessment

After completion of the uCertify course Post-Assessments are given to students and often used in conjunction with a Pre-Assessment to measure their achievement and the effectiveness of the exam.

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