



# Factory

## Foundations of Computer Science

Bootcamp Syllabus

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### Brief

SE Factory is a non-profit, **3-month intensive** coding bootcamp running at almost no cost to the students, that produces professional full stack web developers with highly competitive technical and soft skills.

With currently 3 batches running per year and plans for expansion, SE Factory empowers students from different backgrounds and parts of Lebanon with the skills to conquer and succeed in the job market, impacting their lives as individuals, their communities, and Lebanon as a whole.

SE Factory's "Foundations of Computer Science" 4-week program aims to widen the opportunity of accepting more candidates. Many students from Engineering, Management Information Systems and even Computer Science backgrounds in need of a refresher course on core Computer Science topics can now build or re-learn the skills necessary to strive through the Full-Stack Web Development Bootcamp and beyond.

### Program Goals

Theoretical knowledge without practice doesn't cut it in the workplace. The program puts students through intensive practice of the foundational concepts in computer science to prepare them to move on to industry specific training.

Graduating this course gives students the capability to reason about program performance, convert algorithm descriptions into working applications. Graduates are also exposed to object oriented programming in a manner relevant to the industry. Additionally, the program covers real world programming tooling such as relational databases in a focused environment and introduces the concepts of networking.

SE Factory strives to create a framework where students will concretely be able to apply what they learned through a Computer Science degree and prepare them for the industry. Special focus is given to help students ace their software development interviews, and retain concepts they will make use of throughout their career.

The language of choice of the program is Python, chosen for its emphasis on code readability, its industry relevance both on local and global level, the ease of setup, rich standard library and availability of tools.



**Lectures**      12    24 hours  
**Assignments** 12    ~100 hours      *Expect to do some work / studying in the weekends*

## ***Week #1 – Introduction to the Building Blocks***

**Duration**      (30)    Hours  
**Lectures**      (6)      Hours  
**Assignments** (24)    Hours

### **Monday**

- **Basics of Programming**
  - Variables and Assignments
  - Data Types
  - Conditionals and Branching
  - Loops

### **Wednesday**

- **Imperative Abstractions**
  - Functions
  - Variable Scope
  - Recursion

### **Friday**

- **Basic Data Structures**
    - Lists
    - Dictionaries
    - Value and Reference types
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## ***Week #2 – Algorithms and Analysis***

<b>Duration</b>	(30)	Hours
<b>Lectures</b>	(6)	Hours
<b>Assignments</b>	(24)	Hours

### **Monday**

- **Intro to Algorithms**
  - Basics of Algorithmic Complexity
  - Linear search
  - Binary sort

### **Wednesday**

- **Sorting Algorithms**
  - Selection Sort
  - Insertion Sort
  - Merge sort

### **Friday**

- **Data Structures**
    - Linked Lists
    - Stack
    - Queue
    - Priority Queue
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### ***Week #3 – Object Oriented Programming***

<b>Duration</b>	(30)	Hours
<b>Lectures</b>	(6)	Hours
<b>Assignments</b>	(24)	Hours

#### **Monday**

- **Quick Access Data Structures**
  - o Hash Tables
  - o Trees
  - o Binary Search Trees

#### **Wednesday**

- **Graphs**
  - o Graphs Overview
  - o Graph Adjacency List Representation
  - o Depth First Search
  - o Breadth First Search

#### **Friday**

- **Object Oriented Programming**
    - o Benefits
    - o OOP Basics
    - o Encapsulation
    - o Inheritance
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## ***Week #4 – Programming in the Real World***

**Duration** (30) Hours  
**Lectures** (6) Hours  
**Assignments** (24) Hours

### **Monday**

- **Relational Databases**
  - o SQLite
  - o Data Definition & Modification
  - o Basic Queries
  - o Aggregation
  - o Database Normalization

### **Wednesday**

- **File Systems**
  - o Directories
  - o Reading and Writing Files
  - o Data Formats
  - o JSON
  - o Base64

### **Friday**

- **Networking**
    - o Historical Overview
    - o TCP/IP Network Stack Concept
    - o Internet Layer
    - o Transport Layer
    - o Application Layer
    - o Using Sockets for Communication
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