

BOEING STEM HUB-EGYPT

STEM Coding & Programming

Level I

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PROGRAM OUTLINES

Contents

Program Introduction	2
Program Skills Structure	3
1. Scientific and knowledge skills	3
2. Engineering and Hands-on skills.....	3
3. Personal and Teamwork Skills.....	4
Program Progress Phases	5
Phase 1 – Preparation.....	5
1. S: Scientific and knowledge content	5
2. E: Engineering Practices	5
3. H: Hands on Activities and checkpoint assignment	5
Phase 2 – Design	6
1. S: Scientific and knowledge content	6
2. E: Engineering Practices	6
3. H: Hands on Activities and checkpoint assignment	6
Phase 3 – Implementation.....	7
1. E: Engineering Practices	7
2. H: Hands on Activities and checkpoint assignment	7

Program Introduction

Have ever wondered how all the electronic devices around us think? Did you want before to make them do a specific function you need, but you have no previous knowledge? So, you are welcome! This program is intended to help you acquire the basic science and knowledge of how computers think and determine its functionality. Not just that, but also you will be trained on an effective way of problems solving and critical thinking with a hands-on experience dealing with various situations.



Welcome to the world of Programing, but first you need to be equipped with the suitable knowledge; thus, this program covers various topics ranging from Signaling and Algorithms till programming using Scratch, C and Python languages and the mechanics of running, testing, and debugging with Design and Engineering skills; all combined to help you have a solid background enables you to apply many inter-disciplinary concepts, which is the theme of how all our programs are.

It does NOT stop here; we will go more deeply learning about the design process, problem-solving, algorithms, pseudocodes, debugging and different IDEs; then, each learner will be encouraged to design his own program with his own imagination and visualization about its functionality.



Finally, learners collect all the information and skills they gained to code their program as they visualized it to do certain function, collecting data from the outside world to accomplish specific tasks; Hence, ignites the spirit of competition.



Program Skills Structure

Objectiveless approach isn't what we intend to deliver. There are certain set of skills that are highly targeted to you. These skills will be the core value that we present. Each one will be a trigger for the other, so the skeleton of our programs is truly the essence of those skills. As illustrated in this gear mechanism; get used to this, sooner you will understand, design, and build a complicated gear system of your own.

Knowledge gear is what drives us all, the true and the very meaningful value we need you to acquire. Then here comes the next gear -Practice- where you will do science and knowledge. However, teamworking gear is very essential aspect of our programs. In response to the previous gears, you and your team will be assigned to tasks through the program. You will learn how to manage your time and collaborate with your team mates to accomplish them. Success isn't just about building great things, the economic and business management skills are also crucial in our program to prepare you for a challenging tomorrow's world experience



1. Scientific and knowledge skills

This is the main core of any program we provide. It's not about making fancy stuff without getting into the essence of what and how they are according to the science and knowledge perspectives. Don't worry, we will prepare you so well that take you to the exciting part of building your own innovations.



2. Engineering and Hands-on skills

After you got the knowledge, now it's time to practice it. Using different machines, instruments, equipment, and tools. Enjoy creating something from scratch and make it alive. Nothing can be more joyful than that. You will love the mess you will do in favor of making your first project. But wait, it's not only about you, you should do that with your teammates. So, make as mess as you all want



3. Personal and Teamwork Skills

We are humans, Right? We can't live by ourselves. Although we have different personal and social backgrounds, but we need to learn how to work as a team to accomplish the assigned tasks and pass them. You and your mates may get into opposite opinions, frustrated with different decisions, or even passing through hard times. You will not have the privilege of selecting whom you are working with, life isn't always generous. It's a lesson in your whole life far more than getting a project done. It's about how to be one for all and all for one. You also would go through challenging experience of making business model for your project. It is going to be a great leap in building your character to get ready for the future.



Phase 2 – Design

It is time to solve real problems, but as we used to, it all starts with careful designing and planning; at this stage, we will learn more about stages of designing a code and drawing flowcharts for algorithms and pseudocodes and how to get more compact and abstract in coding (thanks to Python, the third language we will learn its syntax and functions). Here, learners will get familiar with python to be our language from this point of the course and ahead. After that, each learner will be required to choose one of the project ideas provided (ranging from data analysis and representation till games and funny ones) or come up with his own problem to be solved using programming or any program idea then start designing the stages of solving it and writing its pseudocode; they will just determine how the final program will function.

1. S: Scientific and knowledge content

The stage will cover: Flowchart, algorithms, pseudocodes, Programming using Python, Code's Compactness and Abstraction, Engineering design process, problem-solving, debugging, IDEs for Python language.

2. E: Engineering Practices

Learners will be introduced to the principles of determining the suitable hardware components and specifications which able to carry on certain number of computational processes required per second. Also, they will be introduced to various ways of making their codes compact and organized and readable as much as possible.

3. H: Hands on Activities and checkpoint assignment

It will be required to provide the flow chart and pseudocodes designed for their program, a description of their code functionality and specifying what exactly should be achieved and how this can be authentically measured; however, it's not only about our codes! The skill of understanding other people's code, and be able to debug it, is crucial; so, also at this stage learners will be provided with some codes with errors and will be required to solve it till it function properly (some of these codes will be easy to solve and others need time and real effort).



Phase 3 – Implementation

It is the phase where young youth shall put what they've learned into action, and we as instructors see the fruit of what we've seeded. Be ready to fail many times as no one could get it easily right from the first time; here you will dive deeper into Python and start implement your ideas. Yet, you've to keep testing, refining, debugging and solving all the problems you face.

1. E: Engineering Practices

It's time to show your skills; coding, debugging and testing till you reach the functionality you aimed for solving the problem, may you need to restructure your algorithm or flowchart design of the program. Learners will have access to all the used libraries, software and modules introduced in the Program.

2. H: Hands on Activities and checkpoint assignment

What activity is more interesting than applying your knowledge? Each learner will finally build his/her program collecting all the pieces together along with their knowledge to solve real problems with all specified functions working. They will be assessed based on Correctness of how their product meets the functionality of their proposal without bugs and errors and to what extent it's readable logically designed; also, they will be required to showcase their work to their peers and make useful discussion.

