Course Syllabus - Exposure to Code

Information on this course are as follows. You are welcome to contact the instructors for any questions!

Course Item	Description
Times	Wed, 9:00 pm - 10:30 pm for 10 weeks
Location	Lab Comp 1, Phase 2
Instructor 1	Tan Nian Wei (tannianwei@aggienetwork.com)
Instructor 2	Safwan Zulfazli (safwan_zulfazli@hotmail.com)

Course Description and Policy

This class will introduce the concept of coding, what it can do, and inspire sudents to want to learn more.

This class will be introducing concepts only as needed, and be focused on hands-on activities that can be completed within the alloted classroom hours. There will not be mandatory take-home assignments that is core to the learning experience.

It is preferred for students to use their own laptops for this class for convenience. Otherwise, students are welcome to use the computers available in the computer labs.

This class is aimed to cater for upperclassmen, i.e. traditionally Form 4 and Form 5 students. However, there should be no barrier for those seeking knowledge; all age groups are welcome to join and participate if capable.

Information about the class will be provided in the style of a college course, where the schedule and material will be posted online and made accessible to all. Optional readings will be available for the motivated to come to class with more context in mind, and all announcements for the course will be communicated through email.

Course Schedule, Topics and Learning Outcomes

Below is the planned course schedule. Details may vary as the course progresses.

No	Title	Outcome
1	Introduction to Python	Students will be able to perform simple calculations with Python
2	Loops with `for` and `while`	Students will learn basic control flow structures, `for` and `while` for repeating code execution under certain conditions. Students will also be exposed to basic cryptography, and its strong relationship to computation.
3	If/else, Functions	Students will continue to learn basic control flow structures, specifically `if/else` statements. Students will also learn how to package repeatable code in functions.
4	Visualization with `matplotlib`	Students will learn how to make basic plots in Python using `matplotlib`, the de-facto standard for visualization.

No	Title	Outcome
5	`Numpy` vectors & cellular automata	Students will learn the basics of using `numpy`, Python's numerical computing library for array calculations. Students will also be introduced to the concept of cellular automata, one of the many interesting concepts in computer science.
6	Numpy arrays & visualizing chaotic phenomena	Students will learn more about `numpy`, extending last lesson's knowledge to 2D arrays. Students will also be made acquainted with famous chaotic systems, and how code enables the exploration and study of these systems.
7	Numerical methods	Students will be shown how code can be use to solve engineering problems via numerical methods.
8	Solving Partial Differential Equations & Modelling Populations	Students will be shown how coding can be used to solve partial differential equations, in this case with applications in epidemiology and ecology.
9	Randomness & Generative Art	Students will learn abput random numbers in computing, and learn about its relationship with a rather niche application of coding, generative art.
10	Problem Solving Capstone	Students will leverage upon the skills and knowledge picked up in this course to accomplish a mini capstone project, focused on the process of solving problems with code.