MKS21[QA] Course Outline:

Unit I: The Tools Of Computer Science

- How do we use the StuyCS lab computers?
- What is computer science?
- What is an algorithm?
- How can we effectively convey an algorithm?
- What is programming?
- Why do we have programming languages?
- Syntax vs Semantics

Unit II: Fundamentals of Programming using Racket

- Calling Procedures
- Writing Procedures in Racket.
- Creating anonymous procedures with `lambda`.
- Creating identifiers with `define`.

Unit III: Boolean Values and Conditional Statements

- What are Boolean values?
- How do comparison operators work?
- What are Boolean operators?
- Using functions that return Boolean values.
- Using `if`.
- Using `cond`.

Unit IV: Lists and Recursion

- What is a data structure?
- What is a linked list?
- Using cons-cell diagrams.
- Using recursion to work with lists.

Unit V: Computer Hardware/Software

- How do computers represent information?
- What are the main parts of a computer, how do they work together?
- What is the purpose of the operating system?
- What is the internet? How are computer connected on the internet?
- What can be done to secure your information and identity while online?

Unit VI: Introduction to NetLogo Programming with Turtles and Patches

- Understanding Agents and context (turtles, patches, observer).
- Modifying turtle properties with `set`.

- Modifying patch properties with `set`.
- Representing colors.
- Moving turtles.
- Using random values.
- Using boolean values:
  - comparison operators
  - boolean operators
  - `if` and `ifelse`.
- Writing procedures with and without parameters.

Unit VII: Customizing the Interface and Advanced Procedures

- Using buttons and sliders in the interface.
- Writing Reporter functions.
- Using reporter functions as values.
- Using monitors.
- Using `with` to filter agent sets.
- Using `ask` to direct specific agents and agent sets.

Unit VIII: Working With Patches

- Manipulating properties in procedures.
- Introduction to cellular automata, including Conway's Game of Life.
- Programming Conway's Game of Life and other life-like cellular automata.

Unit IX: Advanced Control of Agents and Agent Sets

- Creating and using custom properties.
- Creating and using breeds.
- Turtle-Patch interaction

Unit X: Building larger Programs

- Designing & Prototyping projects before programming.
- Reviewing program prototypes.
- Iterative program development with check points.
- Demonstrating completed projects.