MS1008 – Introduction to Computational Thinking

Course Code	MS1008				
Course Title	Introduction to Computational Thinking				
Pre-requisites	NIL				
Pre-requisite for	MS0003	Introduction to Data Science and Artificial Intelligence			
	MS4671	Introduction to Materials Simulation			
No of AUs	3				
Contact Hours	Lectures	0	TEL (Online Videos)	13	Example Class (Seminars/Hands-on Exercises)	26

Course Aims

Computational thinking (CT) is a problem solving process with the aid of computer; i.e. formulating a problem and expressing its solution in such a way that a computer can effectively carry it out. It includes a number of characteristics, such as breaking a problem into small and repetitive ordered steps, logically ordering and analyzing data and creating solutions that can be effectively implemented as algorithms running on computer. As such, computational thinking is essential not only to the Computer Science discipline, it can also be used to support problem solving across all disciplines, including math, science, engineering, business, finance and humanities.

The aim of this course is hence to take you especially students with no prior experience of thinking in a computational manner to a point where you can derive simple algorithms and code the programs to solve some basic problems in their domain of studies. In addition, the course will include topics to appreciate the internal operations of a processor, and raise awareness of the socio-ethical issues arising from the pervasiveness of computing technology.

Intended Learning Outcomes (ILO)

Upon the successful completion of this course, you shall be able to:

1. Describe the internal operation of a basic processor, how a program is executed by a computer and computing trends.
2. Code basic programs based on the programming language used in the course
3. Formulate a problem and express its solution in such a way that a computer can effectively carry it out. (i.e. equip you with CT skills)
4. Apply the CT concepts on case studies/problem-based scenarios through hands-on practice of the CT processes.

Reading and References

The course will not use any specific text book. The following books and websites will be used as reference materials.
1. The Practice of Computing using Python; William Punch and Richard Enbody, Pearson, 2017.
2. Introduction to Computation and Programming Using Python: With Application to Understanding Data; (2nd Ed) John V. Guttag, MIT Press Ltd, 2016.
3. https://edu.google.com/resources/programs/exploring-computational-thinking/

Course Policies and Student Responsibilities

As a student of the course, you are required to abide by both the University Code of Conduct and the Student Code of Conduct. The Codes provide information on the responsibilities of all NTU students, as well as examples of misconduct and details about how students can report suspected misconduct. The university also has the Student Mental Health Policy. The Policy states the University's commitment to providing a supportive environment for the holistic development of students, including the improvement of mental health and wellbeing. These policies and codes concerning students can be found in the following link.

https://www.ntu.edu.sg/life-at-ntu/student-life/student-conduct

Academic Integrity

Good academic work depends on honesty and ethical behavior. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honor Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, and collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.