National Taiwan University of Science and Technology

2019 Summer Program

CSC 170 Data Structures and Algorithms

Course Outline

Term: July 01-August 02,2019

Class Hours: 16:00-17:50 (Monday through Friday)

Course Code: CSC 170

Instructor: Dr. Mahfuza Farooque

Home Institution: Pennsylvania State University, USA

Office Hours: Friday 12:00-2:00pm

Email: mff5187@psu.edu

Credit: 4

Class Hours: According to the regulations of Minister of Education, R.O.C, 18 class hours could be counted as 1 academic credit in all universities in Taiwan. This course will have 72 class hours, including 40 lecture hours, professor 10 office hours, 10-hour TA discussion sessions, 2-hour review sessions, 10-hour extra classes.

Course Description:
Students in this class will further strengthen their programming skills by learning data structures and problem-solving techniques, as well as some important and advanced features of Java. The new programming paradigm, Object Oriented Programming, will also be emphasized.

We will cover linked lists, stacks, queues, trees, and binary search trees. Students will implement and analyze them in order to understand their advantages and disadvantages for different problems. Some basic techniques

for searching and sorting will be studied. Students will learn how to measure the computational complexity of programs and problems. Also, students will learn a powerful programming technique, recursion, to solve many complex problems.

Required Textbooks:

Data Structures, Abstraction and Design Using Java, Third Edition, by Elliot B.

Koffman & Paul A. T. Wolfgang

Grading & Evaluation: Final grades will be computed per the following:

• Assignments: 35%

• Project(s): 15%

• Midterms: 20%

• Final: 20%

Letter grades will be assigned per the following scale which will be strictly followed.
• 90 – 100 % A
• 80 – 89% B
• 70 – 79% C
• 60 – 69% D

• 0 – 59% F

Course Schedule:

Week1:   Object Oriented Programming and Class hierarchies

Session1: ADRs, Interface, and the Java API, Introduction to OOP

Session2: Method of overloading, Method of Overriding, Polymorphism, Abstract Classes

Session 3:Class Object and Casting, Exception Class hierarchy

Session 4:Packages and Visibility, A Shape Class Hierarchy

Week2:   Lists and the Collections Framework

Session1: Algorithm Efficiency and Big-0, The List Interface

Session2: ArrayList, Application of ArrayList, Implementation of an ArrayList

Session3: Singles Linked List, Double Linked List

Session4: LinkedList Class, Application of the LinkedList Class

Week3:   Stack, Queue, Recursion

Session1: Stack Applications and Implementations

Session2: Queue Application and Implementation

Session3: Recursion, Recursive Array Search

Session4: Recursive Data Structure, Problem Solving with Recursion

Week4:   Trees

Session1: Tree Terminology and Applications, Tree Traversals

Session2: Implementing a Binary Tree, Binary Search Tree

Session3: Heap and Priority quees

Session4: Huffman Trees

Week5:   Sorting, Searching

Session1: Selection Sort, Insertion Sort, Bubble Sort

Session2: Merge Sort, Heap Sort, Quick Sort

Session3: Review Session1

Session4: Review Session2