Metropolitan State University

ICS 340 : Algorithms and Data Structures

A. Course Description

Credits: 4

Prerequisites: ICS 240 Introduction to Data Structures AND MATH 215 Discrete Mathematics

Lab Hours/ Weeks: Corequisites: None

Lecture Hours/ Week :

MnTC Goals: None

Exploration of the design and implementation of data structures and algorithms fundamental to computer systems and applications and to software engineering. Topics include trees, graphs, basic analysis of algorithmic complexity, fundamental questions of computability, and introduction to the algorithmic basis of intelligent systems. Programming projects.

B. Course Effective Dates: 08/17/2014 - Present

C. Outline of Major Content Areas:

See Course Description for major content areas.

D. Learning Outcomes (General)

1. Analyze asymptotical complexities (O(n), O(n2), O(log n), and O(n log n), etc.) of algorithms.
2. Design and implement different hashing algorithms and be able to use them to store or retrieve data.
3. Design and implement non-linear abstract data types such as trees, heaps, and apply them to appropriate problems.
4. Implement and apply different graph algorithms (such as depth first, breadth first, shortest path, and minimum spanning tree, etc.) to solve problems.
5. Select, implement, and apply appropriate sorting algorithms to solve problems.
6. Use pseudo-code to describe algorithms at an intermediate/advanced level.
7. Write programs using recursion at an intermediate/advanced level.
8. Design and implement algorithmic strategies such as Dynamic Programming and Greedy Strategies to solve problems.

E. Learning Outcomes (MN Transfer Curriculum)

This contains no goal areas.

G. Special Information

Note: Students are responsible to both be aware of and abide by prerequisites for ICS courses for which they enroll, and will be administratively dropped from a course if they have not met prerequisites.