Course Outline

1. Document Information

Degree Program	Computer Science
Course Number	CS 330
Course Title	Introduction to the Design and Analysis of Algorithms
Semester Hours	3
Course Coordinator	Banafsheh Rekabdar
Revision Term	Spring 2020
Latest Revision	Fall 2020

2. Catalog Description

A detailed treatment of the design, analysis, and complexity of algorithms, including greedy algorithms, divide and conquer, dynamic programming, and limitations of algorithms as problems get larger or more complex.

3. Textbooks

- Cormen, T. H. (2009). Introduction to Algorithms. The MIT Press, 3rd Edition, ISBN: 978-0262033848.

4. References

5. Course Learning Outcomes

- To understand the advance data structures in-depth.
- To learn the basic concepts of algorithm design.
- To learn how to determine complexity of algorithms

6. Assessment of the Contribution to Student Outcomes

Outcome	1	2	3	4	5	6
Assessed		X				X

7. Prerequisites by Topic

CS 220 with a grade of C or better.

8. Major Topics Covered in the Course

1. Mathematical Foundation: formal treatment of analysis and design of algorithms, growth of functions, summations, recurrences, recursive vs. iterative algorithms, worst cast and average case analysis of algorithms, lower bounds {8 classes}
2. Trees: B-Trees and other balanced trees {8 classes}
3. Hashing: hash functions, collisions and resolutions {6 classes}
4. Heaps: implementations, applications, and variations {3 classes}
5. Sorting: variations of quick sort, merge sort, heap sort {4 classes}
6. Graph algorithms: DFS, BFS, topological sort, minimum spanning trees algorithm, and shortest path algorithm {3 classes}
7. Advanced algorithm design techniques: divide and conquer, greedy and backtracking {4 classes}
8. Introduction to parallel algorithms {4 classes}