



**University of International Business and Economics
International Summer School**

CS 310 Data Structures and Algorithms

Term: June 15 - July 16, 2020

Instructor: Dr. Xiangdong An, Assistant Professor of Computer Science

Home Institution: UT Martin

Email: xan@utm.edu

Class Hours: Monday through Thursday, 120 minutes each day (2,400 minutes in total)

Office Hours: TBD

Discussion Session: 2 hours each week

Total Contact Hours: 64 contact hours (45 minutes each, 48 hours in total)

Location: WEB

Credit: 4 units

Course Description:

This course will introduce you to advanced data structures and algorithms in computer science including balanced search trees, hashing, heaps, algorithm runtime analysis, greedy algorithms, divide and conquer technique, dynamic programming, graph algorithms, amortized analysis and probabilistic analysis.

Prerequisite:

You have good knowledge of basic data structures and algorithms and Calculus/discrete mathematics.

Course Goals:

A student who satisfactorily completes this course should be able to accomplish the following:

1. Find and prove runtime bounds for iterative and recursive algorithms and prove the correctness of algorithms.
2. Design efficient algorithms to solve computational problems.
3. Understand and employ algorithm design paradigms including divide and conquer, dynamic programming, and greedy algorithms in solving varied computational problems.
4. Implement complex algorithms and data structures with a modern high level programming language.

Required Textbook:

Cormen, Leiserson, Rivest, & Stein, *Introduction to Algorithms*. 3rd Edition, MIT Press 2009. ISBN-13 978-0262033848.

Grading Policy:

Programming Projects (3)	30%
Home Assignments (5)	20%
Midterm	20%
Final	30%

Grading Scale:

Assignments and examinations will be graded according to the following grade scale:

A	90-100	C+	72-74
A-	85-89	C	68-71
B+	82-84	C-	64-67
B	78-81	D	60-63
B-	75-77	F	below 60

Academic Integrity:

Academic integrity is the hallmark of University studies, and is key to a successful professional career. If one or more students are found to be in violation of the academic honesty policy, the professor reserves the right to seek disciplinary action as allowable by university policy. Such actions may include (but are not limited to) giving the student a zero on the assignment and/or class.

Course Schedule:

Day 1, Mon: Mathematical preliminaries
 Day 2, Tues: Algorithm runtime analysis
 Day 3, Wed: The Master theorem
 Day 4, Thurs: Disjoint sets
 Day 5, Mon: Hashing
 Day 6, Tues: Balanced search trees
 Day 7, Wed: Heapsort
 Day 8, Thurs: Graph algorithms
 Day 9, Mon: Depth-first search (DFS) and broad-first search (BFS)
 Day 10, Tues: Midterm
 Day 11, Wed: Topological ordering
 Day 12, Thurs: Shortest paths in graphs
 Day 13, Mon: Minimum spanning tree
 Day 14, Tues: Huffman coding
 Day 15, Wed: Divide and conquer
 Day 16, Thurs: Greedy algorithms



Day 17, Mon: Dynamic programming

Day 18, Tues: Amortized analysis

Day 19, Wed: Probabilistic analysis

Day 20, Thurs: Final exam