

CSI 3610: Design and Analysis of Algorithms

Credits Hours: 4 credits, 3.57 contact hours/week.

Instructor: Serge Kruk, Ph.D.

Text book: R. Neapolitan and K. Naimipour, Foundations of Algorithms, Fourth Edition, Jones and Bartlett Publishers, 2011.

Specific course information

Computer algorithms, their design and analysis. Strategies constructing algorithmic solutions, including divide-and-conquer, dynamic programming and greedy algorithms. Development of algorithms for parallel and distributed architectures. Computational complexity as it pertains to time and space is used to evaluate the algorithms. A general overview of complexity classes is given.

Prerequisites: CSI 2310, APM 2663, and major standing

Required course for CS major

Course Objectives: Upon successful completion of this course, students should be able to

- Given a computational problem, model multiple algorithmic solutions and compare them [ABET CS: (b, c, k)]
- Given an algorithm, formulate its time order analysis and assess whether it can be improved [ABET CS: (a, c, j)]
- Given an optimization problem, model it using a greedy approach. Assess the performance of the algorithm and the accuracy of its solution [ABET CS: (a, c, j)]
- Model a problem using a divide and conquer approach. Analyze the correctness of the algorithm and assess its performance [ABET CS: (c, k)]
- Model an optimization problem using the dynamic programming technique. Establish the correctness of the algorithm and assess its performance [ABET CS: (b, c, k)]
- Describe classical algorithms (sorting, searching, graph problems) and discuss their validity and performance [ABET CS: (a, j, k)]
- Describe P and NP classes of problems [ABET CS: (a, j)]

List of Topics:

- Computer algorithms
- Algorithms design and analysis
- Strategies constructing algorithmic solutions
- Divide-and-conquer
- Dynamic programming
- Greedy algorithms
- Development of algorithms for parallel and distributed architectures