SUNY at New Paltz, Fall 2025

CPS415-01: Discrete and Continuous Computer Algorithms

Monday, Thursday: 12:30 - 1:45 pm, HUM 118

Instructor:

Professor Keqin Li
Science Hall 249, X3534, lik@newpaltz.edu

Office Hours:

Tuesday, Friday: 9:00 - 11:00 am

Textbook:

Anany Levitin
Introduction to the Design and Analysis of Algorithms
3rd edition, Pearson, 2012.

Evaluation:

- Homework: 30%
- Midterm Examination (Monday, 10/20/2025): 30%
- Final Examination (Monday, 12/15/2025): 40%

Student Learning Outcomes (Course Objectives):

Upon completion of this course, students will be able to:

A. Understand basic concepts and techniques of algorithm analysis, such as
   1. order of growth and efficiency class of a time complexity function;
   2. analysis of an iterative algorithm using simple algebraic calculation;
   3. analysis of a recursive algorithm using a recurrence relation.
B. Understand major algorithm design techniques such as
   1. divide-and-conquer;
   2. decrease-and-conquer;
   3. transform-and-conquer;
   4. dynamic programming;
   5. and the greedy method.

Course Outline:

- Notion of algorithm (1.1-1.2)
- Orders of growth, asymptotics, efficiency classes (2.1-2.2)
- Analysis of iterative algorithms - tracing inner/outer loops (2.3)
- Analysis of recursive algorithms - solving recurrence equations (2.4)
- Selection sort (3.1)
- Insertion sort (4.1)
- Merge/Mergesort (5.1)
- Partition/Quicksort (5.2)
- Large integer multiplication (5.4)
- AVL trees (6.3)
- Heapsort (6.4)
- Knapsack problem (8.2)
- Optimal binary search tree (8.3)
- All-pairs shortest paths - Floyd's algorithm (8.4)
- Summation formulas (Appendix A)

Academic Policies:

Academic integrity and related academic policies and procedures can be found at http://www.newpaltz.edu/advising/policies.html.

Student Evaluation of Instruction (SEI):

Please complete the form online during 11/24/2025 - 12/8/2025.