# **Algorithms for EE PMP**

## **Course Description**

This course focuses on the analysis and implementation of algorithms for EE PMP students. It covers traditional algorithmic analysis of runtime and correctness while incorporating algorithm implementation (in Python) and empirical evaluation. Heavy emphasis on algorithms for efficient path finding, neural networks, computer vision, and working with sensor data.

## **Course Goals/ Learning Outcomes**

At the end of this course, you will be able to:

- Analyze an algorithm for time complexity, space usage
- Prove an algorithm correct or incorrect
- · Implement an algorithm from pseudocode efficiently in Python
- Estimate clock-runtime/resource usage for an implemented algorithm
- Report empirical support for algorithm runtime/usage

#### **Course Structure**

- Weekly Lectures
  - In-class, recorded, ability to join remotely, highly encouraged to participate synchronously
- Assignments
  - Roughly 1 per week
    - Split between Programming and Written Assignments
  - Programming Assignments
    - 4-5 throughout the quarter
    - · Primarily implementation of algorithms reviewed in class
  - Written Assignments
    - 4-5 throughout the quarter
    - Focused on answering questions such as runtimes, explanations of approaches,
    - May be combined with Programming Assignments
- Tests/Exams
  - 1 low-stakes exam

#### Topics

- Intro to Algorithmic Problems
- Asymptotic Analysis
  - Growth of Functions
- Review of basic sorting algorithms
  - Bubble
  - Insertion
  - Selection
  - Merge
  - Counting
  - Heap
  - Quick
- Proving Correctness
  - Counterexample (non-correctness)
  - Induction
  - Loop Invariants
- Algorithmic Approaches
  - Divide and Conquer
  - Greedy
  - Dynamic Programming
  - Linear Programming (?)