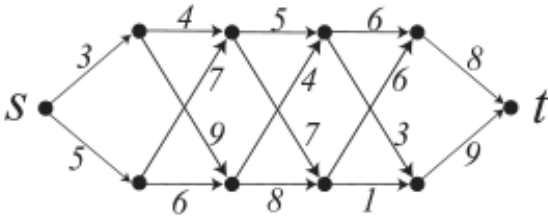# CSCI 148: Graph Algorithms

Claremont McKenna College, Fall 2020
Monday/Wednesday, 9:35-10:50am
Instructor: Sarah Cannon

Graphs, like the one above, are used to represent a wide variety of processes across disciplines, from math and computer science to physical and social sciences. In this Graph Algorithms class, we'll develop the skills necessary to turn concrete real-world problems into graph problems, and to approach, understand, and solve those problems. For example, in the graph on the left above, if the numbers represent travel time, what's the quickest way to get from s to t? How can we come up with an algorithm that can answer that question for any graph? How can we use special structure, like the pattern above, to speed up our algorithm?

This course will have a small programming component (in python, using the networkx package), but will be mostly focused on problem-solving skills, mathematical reasoning, and proof. We'll learn how to approach problems, how to design correct, efficient algorithms for them, and how to prove our algorithms work as we intend.

Topics:
- divide and conquer algorithms
- search algorithms
- greedy algorithms
- path and flow algorithms
- dynamic programming
- complexity
- and more!

Prior Knowledge: Students should be familiar with:
- programming beyond an introductory course
- data structures
- big-O notation
- basic graph definitions
- mathematical proof.

At CMC, these topics are covered by the combination of CSCI 46 – Data Structures and Algorithms and MATH 55 – Discrete Mathematics.

Note: This course is **not open to computer science majors** or other students who have taken or plan to take CSCI 140: Algorithms due to significant curricular overlap.

It counts as an elective for CMC's math major, computer science sequence, and data science sequence

Questions? Contact scannon@cmc.edu