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# Using Graph Theory to Solve Scheduling Problems

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# Instructor Information

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## 1 Introduction

This document is intended to introduce the instructor to the curriculum materials that we have compiled as part of the Arthur Vining Davis High Impact Fellows project. In this electronic packet, each of the following documents are included in PDF and LaTeX formats for your use:

- Class Handout for graph theory lesson
- Instructor copy of Class Handout
- Appendix containing additional examples
- Presentation with applications of graphs
- Student assignment with scheduling problems
- Answer key to student assignment

## 2 Suggestions for Use in the Classroom

### 2.1 Use Crayons!

There is no better way to learn vertex colorings than by using actual crayons, markers, or colored pencils to assign colors to the vertices. Encourage students to write the color name in pencil first because crayons are hard to erase. This is a great way to visually check that it is a correct vertex coloring.

### 2.2 Students Make Graphs with Marshmallows and Toothpicks

In order for the students to have a more hands-on experience with graphs, the students can make graphs using marshmallows (graph vertices) and toothpicks (graph edges). The instructor can prompt students to make a graph with  $x$  vertices and  $y$  edges. Or the instructor can challenge the students to create a graph with a vertex of degree  $x$ .

### **2.3 Create Graph using Students as Vertices**

Another option to get students out of their seats would be to have the students themselves be part of a graph made by the whole class or a subset of the class. Students could stand in a random pattern and toss a ball of string to each other to create the edges. Then you can go around the circle and have each student say his or her degree (the number of edges coming from the student/vertex). To practice doing a graph coloring, the students can wear “bibs” made out of construction paper and yarn so that their color can be seen.