CSCI-4260/MATH-4150: Graph Theory

www.cs.rpi.edu/~slotag/classes/SP20t/index.html

Prof. George M. Slota
gmslota@gmail.com
Office Hours: Monday/Wednesday at 4-6pm in 317 Lally

TA: Colin Goldberg
goldbc@rpi.edu
Office Hours: Tuesday/Friday 4-6pm in 127 Amos Eaton

Class Hours: 10-11:50pm M/Th in 203 Ricketts

1 Course Description

This course discusses fundamental concepts of Graph Theory and its applications in computer, social, and natural sciences. The topics include: graphs as models; representation of graphs; trees; universal trees; distances; matchings; connectivity; flows in networks; colorings; cycles; planarity; and other computational problems and algorithms. Concepts and methods will be presented through proofs, exercises, and applications.

1.1 Prerequisites

Students should have taken a course in discrete mathematics, such as CSCI-2200 Foundations of Compute Science or MATH-4090 Foundation of Analysis. Additionally, although not formally required, students should have moderate programming experience to best understand the coding-based application demonstrations and algorithmic discussion. Students will not be required to write their own code, although knowledge and understanding of algorithms, complexity, and basic data structures is **necessary**.

1.2 Course Resources

The course textbook is *Introduction to Graph Theory - 2nd Edition* by Douglas B. West. The textbook can be found at the student bookstore or online through Amazon/Ebay/"etc". Course notes, code, and additional resources will be available through the course website.

2 Course Schedule

Classes will meet every Monday, Tuesday, Thursday, and Friday at 4:00pm in 214 Amos Eaton during the first 6 weeks of the Summer 2019 semester (May 20th to June 28th) with the following exceptions:

Jan 20: **No** class - MLK Day
Feb 18: **Yes** class - Monday schedule

The following is the schedule for exams (**may change**):

Mar 5: Midterm
Finals Week: Final

For an up-to-date schedule with class notes and content, check the website.

3 Coursework and Grading Policies

Exam policy: There will be one in-class midterm exam worth 30% of the course grade and an in-class final worth 40% of the course grade. **Exams will be closed notes, closed book, and closed neighbor**. There will be no makeups for exams unless there is either a verifiable department-approved excuse or a prior arrangement is made with the instructor. Students who know they are going to miss a test must notify me in advance. Special circumstances can be accommodated only if I am notified about them in advance. Any questions about scores or grading must be discussed ASAP with the instructor, especially before final grades are posted.

Quiz policy: Quizzes will comprise 10% of the course grade. There will be approximately 10 in-class quizzes throughout the semester, on a weekly basis. Quizzes will be open book and open neighbor – consider them as in-class practice of the material versus an actual "quiz" – **but you must still complete all problems on your own**. Although attendance is not mandated, a missed quiz will result in a zero with no chance for a makeup outside of a verifiable excuse. Quiz solutions will be posted online and worked through through in class, time-permitting. Generally, quizzes will be given on Fridays.

Homework policy: Homework will comprise 20% of the course grade. There will be approximately 5 homeworks throughout the semester, on a bi-weekly basis. Collaboration is allowed on homeworks, **but you must still complete all problems on your own**. In addition, there will be practice problem sets created for each exam. It is **highly** recommended that students complete these problem sets to prepare for the exams. If you complete and fully understand all assigned problems, you are likely to do very well. Homework submissions will be collected in Submitty. No extensions or late homework will be accepted outside of verifiable and approved circumstances, as we will go over homework solutions in-class.

Grade Modifiers Policy: Grade modifiers will be used in this class. You can expect to

earn a B- if your score is greater than 79.5 and less than 83, B if your score is greater than 83 and less than 86, B+ if your score is greater than 86 and less than 89.5. The similar modifier points occur for the A, C and D ranges except that there is no A+ nor D- under the RPI Grade Modifier Policy. **Requests for grade changes will be ignored, unless there was an identifiable error on my/a TA's part**.

Curve Policy: Curves will be applied to exam and final grades up to the discretion of the instructor. I usually just use a flat point adjustment to change the arithmetic mean grade. This means that you can't rely on a big ol' curve to boost up your grade if you're in the tail of the distribution; but if you do all the work and put in time studying, you'll probably do quite well. This course isn't intended to be exceptionally difficult.

4 Academic Integrity

Collaboration is allowed during in-class quizzes and with homework, but is forbidden during exams. You may also not bring crib sheets to examinations. For quizzes and homeworks, you are still **required to complete every problem on your own**. You can't just share and copy answers, but you can share ideas and approaches. This means that turning in an identical copy of your classwork's work or otherwise misrepresenting another person's work as your own will be considered an academic integrity violation. Don't be lazy.

The evaluation of student performance is a service provided by Rensselaer. Attempts to undermine this service lower Rensselaer's reputation. Therefore, it is essential that academic honesty be preserved. Students who violate the spirit or letter of these rules are subject to penalties according to the principles outlined in the Rensselaer Handbook:

`https://info.rpi.edu/sites/default/files/Handbook-of-Student-Rights-and-Responsibilities-Rev-August-29-`

In this class, first-time violations to the above policies will result in a zero on the homework/quiz/exam with which the violation occurred. Any subsequent violations will result in failure of the course. These punishments are up to the discretion of the instructor, but, generally speaking, I probably won't be particularly forgiving.

5 Learning Outcomes

At the end of this course, you will:

- understand some of the main topics and results in basic Graph Theory
- gain problem solving skills and proof techniques for problems on graphs
- have learned several graph applications and algorithms
- recognize that everything is a graph