George Mason University
Department of Mathematical Sciences

Combinatorics and Graph Theory

Fall 2019

Course: MATH-641, section 003.

Total Credits: 3.

Purpose: A introduction to graph theory and basic enumerative combinatorics. We will discuss theory, algorithms and some applications to real world problems in terms of graphs. Emphasis will be on understanding the main ideas of the theory of graphs rather than just applying it.

The hope is, that after this course, the student should have a firm basic understanding of graph theory and enumerative combinatorics, enough to be able to read more advanced texts, research articles and apply the material to other branches of mathematics and beyond.

Prerequisites: Most important is to have mathematical maturity and an open mind. Roughly what I expect is listed as follows:

- Required – (1) Math 125, Discrete Mathematics I, or equivalent. (2) Math 203, Matrix Algebra (Linear Algebra), or equivalent.
- Preferred – (1) Math 321, Abstract Algebra, or equivalent. (2) Math 325, Discrete Mathematics II, or equivalent.

NOTE! This is slightly different from what is stated in the official WebSite: `catalog.gmu.edu/` (Click on "Course" and write "math 641".)

Times and Places: MW 10:30 – 11:45 am. Planetary Hall, room 126

Period: From August 26. to December 18.

Dates to keep in mind:

September 3: Last day to add classes.
September 9: Last day to drop with no tuition liability.
September 17: Last day to drop with no academic liability.

Professor:
Geir Agnarsson
Exploratory Hall 4412
Phone number: (703) - 993 - 1477
email: `geir@math.gmu.edu`

Office-hours: MW 12:30 – 1:30 pm, or by appointment.

Required Text: Geir Agnarsson and Raymond Greenlaw, *Graph Theory; Modeling, Applications, and Algorithms*. Pearson Prentice Hall, (2007).

Material: Roughly Chapters 1 – 10.

Homework (HW): HW will be assigned every week on Wednesdays. They are to be handed in at the start of the class on the following Monday. They will be graded. The solutions will be written and posted on the class WebSite (see below). On occasion the solutions will be discussed, but for the most part the students are responsible for reading and understanding the solutions. Sometimes problems, that are not to be handed in, will also be discussed.

WebSite: All homework and announcements for this class and pdf-files of the solutions and additional handouts will be posted on the following class WebSite:

`math.gmu.edu/~geir/courses/641fall19/`

Examinations: There will be one midterm exam (MT) and one final exam (FL). The midterm will cover the material up to that point in lecture and will be one hour long. The final exam will serve as a second midterm and roughly cover the material from the midterm to the end of the course. It will also be one hour long. – Both exams, the midterm and the final, will consist of both read material (proofs/definitions from lecture notes and text) and problems.

Midterm (MT): Monday, October 21., 10:45 – 11:45 pm, Planet 126.

Final (FL): Wednesday, December 11., 10:30 – 11:30 pm, Planet 126.

Final Project (FP): Each student is required to write a final project or report on a specific topic in graph theory and/or combinatorics. The report should be short and to the point (about 3 – 10 letter sizes pages.) It will give the student an opportunity to study a specific topic of his or her choice, preferably that was *not* covered in the course. The report should demonstrate understanding of the presented results, be self contained, and show explanations which are accessible to the non-specialist.

Grading: Your grade for this course will be based on the following number (between 0 and 100): HW 20% + MT 35% + FL 35% + FP 10%

Policy:

- Absence from an exam (midterm or final), without proper explanation, is an automatic zero on that exam.
- To pass the class one MUST TAKE THE FINAL

Collaboration: Healthy discussion about the homework problems among your classmates is allowed and even encouraged. Be sure though, to write your own solutions when turning in the homework.

Geir Agnarsson
August 23, 2019