Syllabus

General Info

Course MAT461 Advanced Seminar: Graph Theory

Instructor Charilaos Skiadas (skiadas at hanover dot edu)

Term Winter 2017-2018

Office SCH 121C / LYN 108

Office Hours MWF 10-11 in SCH 121C, T 12-2 in LYN 108, and by appointment

Book *A first course in Graph Theory*, G. Chartrand and P. Zhang

Websites for notes[1].

Class times TR 10:00am-11:45am in CFA 111

Course Description

Graph Theory is the study of the mathematical objects known as graphs. Graphs consist simply of 'vertices' and 'edges' connecting these vertices, and as such have a wide range of applications from the study of social networks to the intricate details of register allocation in programming language compilers. In this course we will be introduced to the fundamental definitions and theorems pertaining graphs and get an appreciation for the very diverse kinds of graphs that are available.

The topic of Graph Theory is also an excellent opportunity for students to develop their mathematical abilities in terms of understanding definitions and developing proofs for theorems, as well as building mathematical intuition. The simple description of most definitions and theorems provides ample opportunity for exploration.

In this course you will

- understand the basic structures and theorems of Graph Theory,

- explore a plethora of interesting graph examples and properties,

- enhance your ability to both understand and construct mathematical proofs,

- experience the work mathematicians do as they explore statements whose validity is not known in advance.

Topics

As time permits, the following topics will be covered:

1. Basic definitions of graphs, connectedness, degree sequences etc.

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[1]skiadas.github.io/AlgorithmsCourse/site/

2. Acyclic graphs in general and trees in particular.

3. The degree of connectivity of a graph and various ways to measure it.

4. Eulerian and Hamiltonian graphs and their properties.

5. Directed graphs and tournaments.

6. Planar graphs and graph coloring.

Course Components

Reading Notes

On the website you will find a schedule[2] with links to documents for each class day. In those documents you will find notes for the day's lesson, and reading assignments. You are expected to do the reading *before* class.

Class Attendance And Participation.

You are expected to attend every class meeting. You are only allowed to miss 3 classes without excuse. From that point on, every unexcused absence will result in a reduction of your final score by one percentage point. Excused absences should be arranged in advance, and backed by appropriate documentation. Emergencies will be dealt with on an individual basis. There are very few reasons that would qualify as an excuse for an absence. During each class day you will be working on and submitting activity sheets, which will be scored as your class participation grade.

Homework Assignments

There will be regular written assignments, in addition to numerous practice problems that you are expected to work on. Homework assignments will count for 25% of the final grade.

Exams

There will be two midterms, tentatively scheduled for 2/22 and 4/3, and a final during finals week. **You have to be here for the exams**. If you have conflicts with these days, let me know as soon as possible. Do not plan your vacation before you are aware of the finals schedule.

Getting Help

- You should never hesitate to ask me questions. I will never think any less of anyone for asking a question. Stop by my office hours or just email me your question, which has the great benefit of forcing you to write it down in clear terms, which often helps you understand it better.

- You are allowed, and in fact encouraged, to work together and help each other regarding the notes and the the theory. You can also discuss general questions about the homework assignments. But I expect you to work on the homework assignments on your own.

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[2]http://skiadas.github.io/GraphTheoryCourse/site/schedule.html

Grading

Your final grade depends on class attendance, homework, midterms and the final, as follows:

Component	Percent
Participation	10%
Assignments	25%
Lowest Midterm	15%
Middle Midterm	20%
Highest Midterm	30%

This gives a number up to 100, which is then converted to a letter grade based roughly on the following correspondence:

Letter grade	Percentage Range
A, A-	90%-100%
B+, B, B-	80%-90%
C+, C, C-	70%-80%
D+, D, D-	60%-70%
F	0%-60%