

# Graph Algorithms

Fei Li\*

- LECTURE TIME

**Thursday 7:20pm-10:00pm**

- LOCATION

**Innovation Hall 208**

- COURSE WEBPAGE

<http://cs.gmu.edu/~lifei/teaching/cs684spring17/syllabus.pdf>

- CREDIT

3

- TEXTBOOK (online access from GMU's library)

**Combinatorial Optimization, Theory and Algorithms** by Bernhard Korte and Jens Vygen (KV), 2008, 4th edition

- PREREQUISITES

CS583 with grade A– or above, or instructor's permission

- INSTRUCTOR

Fei Li, Room 5326, Engineering Building

- OFFICE HOURS

**Monday 1:00pm-3:00pm**

- GRADING POLICY:

- assignments (40%)
- 1-2 people's project (50%)
- 1-2 people's a project presentation (10%)
- [95, 100] : A+; [90, 94] : A; [85, 89] : A–; [80, 84] : B+; [75, 79] : B; [70, 74] : B–; [65, 69] : C; [0, 64] : F

- SYLLABUS (to be updated over time)

- PAPER LISTS (to be updated over time)

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\*Department of Computer Science, George Mason University. Email: [lifei@cs.gmu.edu](mailto:lifei@cs.gmu.edu)

Topics	Dates	Chapters	Reading assignments	Notes
Graph theory and classic algorithms				
1 (basic)	01/26	KV 1, 2		
2 (background: mathematical programming)	02/02	KV 3, 4, 5		
3 (trees, paths)	02/09	KV 6, 7		
4 (flows)	02/16	KV 8, 9		
5 (matching)	02/23	KV 10, 11, 12		
6 (matroids)	03/02	KV 13, 14		
7 (background: NP-completeness and approximation algorithms)	03/09	KV 15, 16		
03/16 (Spring break)				
Advanced graph algorithms				
8 (multi-commodity flow)	03/23	KV 19		
9 (network design)	03/30	KV 20		
10 (TSP)	04/06	KV 21		
11 (facility location)	04/13	KV 22		
12 (project presentations)	04/20			
13 (project presentations)	04/27			
14 (project presentations)	05/04			

1. D. R. Karger and C. Stein, "A new approach to the minimum cut problem", Journal of the ACM, 43(4):601-640, 1996
2. E. Tardos, "A strongly polynomial minimum cost circulation algorithm", Combinatorica, 5(3):247-255, 1985
3. M. X. Goemans and D. P. Williamson, "Improved approximation algorithms for maximum cut and satisfiability problems using semidefinite programming", Journal of the ACM, 42(6):1115-1145, 1995
4. M. Golin, R. Raman, C. Schwarz, and M. Smid, "Simple randomized algorithms for closest pair problems", Nordic Journal of Computing, 2:3-27, 1995
5. S. Arora, "Polynomial time approximation schemes for Euclidean TSP and other geometric problems", Journal of the ACM, 45(5):753-782, 1998
6. M. Charikar, S. Guha, E. Tardos, and D. Shmoys, "A constant-factor approximation algorithm for the  $k$ -median problem", ACM STOC, 1999

- POLICIES

Please note that all coursework is to be done independently. Plagiarizing the homework will be penalized by maximum negative credit and cheating on the exam will earn you an  $F$  in the course. See the GMU Honor Code System and Policies at George Mason University Honor Code.

You are encouraged to discuss the material BEFORE you do the assignment. As a part of the interaction you can discuss a meaning of the question or possible ways of approaching the solution. The homework should be written strictly by yourself. In case your solution is based on the important idea of someone else please acknowledge that in your solution, to avoid any accusations.

- ACADEMIC HONESTY

The integrity of the University community is affected by the individual choices made by each of us. GMU has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct.

Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.

- DISABILITY STATEMENT

If you have a learning or physical difference that may affect your academic work, you will need to furnish appropriate documentation to the Disability Resource Center. If you qualify for accommodation, the DRC staff will give you a form detailing appropriate accommodations for your instructor.

In addition to providing your professors with the appropriate form, please take the initiative to discuss accommodation with them at the beginning of the semester and as needed during the term. Because of the range of learning differences, faculty members need to learn from you the most effective ways to assist you. If you have contacted the Disability Resource Center and are waiting to hear from a counselor, please tell me.