CSC 525 Combinatorial Optimization
Spring 2019

Instructor: Iyad Kanj
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Office Hours: Monday & Tuesday 4:00-5:30
Course Website: https://d2l.depaul.edu/

Course Description

Concepts and techniques for formulating and modeling optimization problems will be introduced, and a set of fundamental problems in combinatorial optimization will be covered. We will study the computational difficulty of this set of problems (easy/hard to solve), and techniques for coping with problems that are not efficiently solvable.

Prerequisites

CSC 421.

Textbook

No textbook is required for this course. Lecture notes will be provided on D2L.

Optional Textbooks/References

- C. H. PAPADIMITRIOU AND K. STEIGLITZ, Combinational Optimization: Algorithms and Complexity, Dover, ISBN 0486402584, (1998).

- U. VAZIRANI, Approximation Algorithms, Springer Verlag, ISBN 3540653678, (2001).

- B. Korte and J. Vygen, Combinatorial Optimization: Theory and Algorithms (5th edition), Springer Verlag, ISBN 3642244874, (2012).

- G. Ausiello, P. Crescenzi, G. Gambosi, V. Kann, A. Spaccamela, M. Protasi, Complexity and Approximation: Combinatorial Optimization Problems and their Approximability Properties, Springer Verlag, ISBN 3540654313, (1999).

Attendance

Attendance is optional but is highly recommended. Students who miss a lecture are responsible for the material covered in the lecture.

Grading

- *Homework assignments — 40%*

  Assignments are due on the specified due date and time. Late submissions are not accepted.

- *(Research) Project — 60%*

  The project details will be discussed in class. Each of you is expected to choose a suitable problem for her/his project. You can pick the problem yourself and discuss it with me, or you can work on one of the problems that will be suggested in class. A final report of the project describing the work done is due on June 10th.

Topics

1. Quick Review.

2. Maximum Flow.

3. Matching and Weighted Matching.

4. Linear Programming.

5. Approximation Algorithms.

6. Exact and Parameterized Algorithms.

Plagiarism

All assignments must be done on **YOUR OWN**. You are strictly prohibited from using any source other than the text and the lecture notes when working on the homework problems. In particular, you are strictly forbidden from acquiring hints and/or solutions from the internet or from any other external resource or person (besides the instructor). Copying is strictly forbidden. Scholastic dishonesty includes acquiring answers from any unauthorized source, working with another person except when permitted by the instructor, observing the work of other students during any exam, providing answers when not specifically authorized to do so, and informing any person of the contents of an exam prior to the exam. Disciplinary actions range from grade penalty to expulsion. Please refer to the school policy on plagiarism for more specific details.

Learning Outcomes

- Students will be able to formulate and model optimization problems using proper mathematical models.

- Students will be able to identify the computational difficulty of optimization problems.

- Students will be able to design efficient solutions to optimization problems, if it is computationally feasible, by choosing from a set of well-known techniques.

- Students will be able to cope with optimization problems that are not efficiently solvable, by studying techniques developed for such problems.

Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential. To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at: csd@depaul.edu

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Course Evaluation: School Policy

Course and instructor evaluations are critical for maintaining and improving course quality. Please complete the evaluations at the end of the quarter.