

Course Information for Math 894

Instructor: Tamon Stephen
Meeting Time: F 3:30-4:20 in P9314 (tentative)
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Office Hours: Following class and by appointment.
Grading: 25% Homework, 75% Presentations of Course Material.

1. **Syllabus.** This course is an introduction to techniques for non-linear discrete optimization. The plan is to cover Graver basis (augmentation) methods, convex discrete maximization and cutting plane methods.

2. References

[dLHK] Jesús A. De Loera, Raymond Hemmecke, and Matthias Köppe, *Algebraic and Geometric Ideas in the Theory of Discrete Optimization*. SIAM, 2013.

[Onn] Shmuel Onn, *Nonlinear Discrete Optimization*. Zurich Lectures in Advanced Mathematics European Mathematical Society, 2010.

[GLS] Martin Grötschel, Laszlo Lovasz, and Alexander Schrijver *Geometric algorithms and combinatorial optimization*. Algorithms and Combinatorics: Study and Research Texts, Springer-Verlag, 1988.

[LSW] Yin Tat Lee, Aaron Sidford, and Sam Chiu-wai Wong, *A Faster Cutting Plane Method and its Implications for Combinatorial and Convex Optimization*. arXiv:1508.04874.

3. **Detailed Outline.** The actual topics covered will depend on time and interest, we will not be able to cover the entire material.

For Graver bases, we follow the introduction of [dLHK] (Chapter 3, with material from Chapters 1 and 2 as needed), and optionally Chapter 4. See also Chapter 3 of [Onn].

For convex discrete maximization, Chapter 2 of [Onn].

For cutting plane methods, [GLS] and [LSW].

4. **Homework.** There will be two or three homework assignments during the term. Late homework will not be accepted.

You are encouraged to talk with each other and the instructor about the homework, but you must write up the solutions yourself, using your own words.

5. **Presentations.** This is a reading course, and the material will be presented by the students taking the class. These presentations will also be the main means of evaluation of students. The topics of the lectures will be set in advance in consultation with the instructor.

The presentations must be accompanied by well-written overheads or lecture notes that will be available to the class and form part of the evaluation.

6. **Religious Accommodations.** Students requesting religious accommodation must tell the instructor by the end of the first week of term.
7. **Software.** Some of the homework exercise may involve downloading and using specialized software related that performs computations relevant to the topic.
8. **Questions.** Questions are encouraged in class and out.

Have a great term!