TEXAS A&M UNIVERSITY

SYLLABUS

Course title and number	Math 689: Introduction to Semi-Definite and Algebraic Optimization
Term (e.g., Fall 200X)	Spring 2017
Meeting times and location	TR 9:35-10:50am, Room CVE 136

Course Description and Prerequisites

Introduction to basic quantitative results and algorithmic techniques for solutions sets of polynomial inequalities. After a quick review of linear optimization, polyhedral geometry, and matrix factorizations related to quadratic forms, we will learn the basics of linear matrix inequalities, interior point methods, and their connection to real algebraic geometry. Time permitting, additional topics such as connections to sums of squares, Hilbert's 17th Problem, spectrahedra, approximation algorithms in combinatorial optimization, hyperbolic polynomials, and real nullstellensatze may be covered. We assume a strong linear algebra background (e.g., Math 323) and graduate status, unless the instructor consents to an exception.

Learning Outcomes or Course Objectives

To form a solid background in optimization and real algebraic geometry, to enable further advanced study and comfort with reading the current literature in convex algebraic geometry.

Instructor Information

Name	J. Maurice Rojas
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Email address	rojas@math.tamu.edu
Office hours	TBA
Office location	Blocker 620C

Textbook and/or Resource Material

D. Bertsimas and J. N. Tsitsiklis. Introduction to Linear Optimization. Athena Scientific, 1997.

G. Blekherman, P. A. Parrilo, and R. Thomas, editors. Semidefinite optimization

and convex algebraic geometry, volume 13 of MOS-SIAM Series on Optimization.

SIAM, 2012.

Optimization Models by Giuseppe C. Calafiore (Author), Laurent El Ghaoui (Author)

2014 cambridge u press

G. M. Ziegler. Lectures on polytopes, volume 152 of Graduate Texts in

Mathematics. SpringerVerlag, New York, 1995.

Grading Policies

Bi-weekly homeworks, participation, and a final project. Students are expected to do latex scribing for a small number of lectures. Projects involving applications outside of mathematics are highly encouraged.

Grading

Standard Letter Grading Scale:

A = 90-100
B = 80-89
C = 70-79
D = 60-69
F = <60, along with renormalizations (depending on difficulty).