

OREM 5364: Fall 2023

Advanced Operations Research

TR: 11:00 am - 12:20 pm Caruth Hall 0383

Instructor(s)	: Prof. Harsha Gangammanavar	TA(s)	: Ms. Leyla Tavassoli
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Office hours	: Caruth Hall 331 TR 2:00 pm - 3:00 pm.	Office hours	: TBA
Laboratory	: Caruth Hall 0314 T 8:00 am - 9:20 am		TBA

Description

The course covers advanced topics pertaining to formulations, solution methods and applications of integer programming, non-linear programming, dynamic programming, and optimization under uncertainty. The course will also cover methods in metaheuristics, and formulation and solutions procedures for problems arising in game theory. Students must enroll in a laboratory section where specialized software for modeling and solving will be introduced. Prerequisite: C- or better in EMIS 3360.

Objectives

1. Introduce students to optimization under uncertainty.
2. Enable students to build and solve mathematical model for problems involving sequence of interrelated decisions.
3. Expand on students' knowledge of linear programs with continuous variables to problems where decisions can take only discrete/integer values. The students will also learn to model logical constraints, scheduling interrelated activities etc. within mathematical programs.
4. Show modeling and solution tools for nonlinear programs where the objective and/or constraints are nonlinear functions of decision variables.
5. Demonstrate two-person zero-sum games and solve them using different solution procedures.
6. Show heuristic methods to find good approximate solutions to difficult combinatorial problems which cannot be solved using standard optimization techniques.

Laboratory Session:

This will supplement the lectures by serving as recitation class and to help with homework assignments. The students must enroll in a lab session to be held in 314 Caruth Hall. You must have a Lyle computer account to use the lab computers. Alternatively, you may use your own PC or Mac in the lab.

Course Material:

- **Textbook:** Frederick S. Hillier and Gerald J. Lieberman, *Introduction to Operations Research*, McGraw-Hill, eleventh edition, 2021, ISBN: 1259872998.
- **Other material:** Selected lecture notes, homework exercises and their solutions, course announcements, and other course related material will be posted on the course page on Canvas.

Course Requirement and Grading:

- **Homework:** A total of five (tentatively) homework sets will be assigned over the semester to help you understand the concepts developed in the class. All homework assignments are weighted equally.

The students will turn in homework electronically on Canvas. The students are encouraged to discuss the course material, including homework, with their classmates. However, they are completely responsible for their final submission. The assignments should be submitted in a **single MS Word or PDF file** (cell phone camera pictures of handwritten notes will not be accepted).

Late homework will not be accepted for grading, unless prior permission has been granted. Please make sure you complete the homework early to avoid any unforeseen situations (internet/electronic troubles etc.).

- **Examinations:** All exams will be comprehensive, in-class and closed book. You are allowed to bring one 8.5" x 11" sheet of hand written notes for use during the exam. This sheet must be turned in with the exam. Students are allowed to use their calculators in the exams. Tentative dates are as follows:

Exam	Date
Midterm	October 05, 2023
Final	TBD.

Scheduling conflicts: Legitimate conflicts that prevent you from taking your exam on scheduled dates and special requests should be notified within the first two weeks of the course. Any requests after that time will be handled on case-by-case basis.

- **Grade distribution:**

- Assignments: 50%
- Midterm: 25%
- Final Exam: 25%

Final grades will be assigned using the following grading scale (in %):

A	[93,100]	A-	[90,93)	B+	[87,90)	B	[78,87)	B-	[75,78)	C+	[72,75)
C	[63,72)	C-	[60,63)	D+	[57,60)	D	[53,57)	D-	[50,53)	F	[0,50)

University policies:

- **Disability Accommodations:** Students who need academic accommodations for a disability must first register with Disability Accommodations and Success Strategies (DASS). Students can call 214-768-1470 or visit smu.edu/DASS to begin the process. Once they are registered and approved, students then submit a DASS Accommodation Letter through the electronic portal, DASS Link, and then communicate directly with each of their instructors to make appropriate arrangements. Please note that accommodations are not retroactive, but rather require advance notice in order to implement.
- **Sexual Harassment:** All forms of sexual harassment, including sexual assault, dating violence, domestic violence and stalking, are violations of SMU's Title IX Sexual Harassment Policy and may also violate Texas law. Students who wish to file a complaint or to receive more information about the grievance process may contact Samantha Thomas, SMU's Title IX Coordinator, at accessequity@smu.edu or 214-768-3601. Please note that faculty and staff are mandatory reporters. If students notify faculty or staff of sexual harassment, they must report it to the Title IX Coordinator. For more information about sexual harassment, including resources available to assist students, please visit smu.edu/sexualmisconduct.

- **Pregnant and Parenting Students:** Under Title IX, students who are pregnant or parenting may request academic adjustments by contacting the Office of Student Advocacy and Support by calling 214-768-4564. Students seeking assistance must schedule an appointment with their professors as early as possible, present a letter from the Office of the Dean of Students, and make appropriate arrangements. Please note that academic adjustments are not retroactive and, when feasible, require advance notice to implement.
- **Religious Observance:** Religiously observant students wishing to be absent on holidays that require missing class should notify their professors in writing at the beginning of the semester and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence.
- **Medical-Related Absences:** To ensure academic continuity and avoid any course penalties, students should follow procedures described by their instructors in order to be provided with appropriate modifications to assignments, deadlines, and exams.
- **Excused Absences for University Extracurricular Activities:** Students participating in an officially sanctioned, scheduled university extracurricular activity should be given the opportunity to make up class assignments or other graded assignments that were missed as a result of their participation. It is the responsibility of the student to make arrangements for make-up work with the instructor prior to any missed scheduled examinations or other missed assignments. (See current Catalog under heading of "Academic Records/Excused Absences.")
- **Academic Dishonesty:** Students are expected to embrace and uphold the SMU Honor Code. Violations of the Honor Code will be acted upon in accordance with the policies and procedures outlined in the Mustang Student Handbook.
- **Student Academic Success Programs:** Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Canvas. Students who would like support for subject-specific tutoring or success strategies should contact SASP, Loyd All Sports Center, Suite 202; 214-768-3648; smu.edu/sasp.
- **Caring Community Connections Program:** CCC is a resource for anyone in the SMU community to refer students of concern to the Office of the Dean of Students. The online referral form can be found at smu.edu/deanofstudentsccc. After a referral form is submitted, students will be contacted to discuss the concern, strategize options, and be connected to appropriate resources. Anyone who is unclear about what steps to take if they have concerns about students should contact the Office of the Dean of Students at 214-768-4564.
- **Mental Health Resources:** Throughout the academic year, students may encounter different stressors or go through life experiences which impact their mental health and academic performance. Students who are in distress or have concerns about their mental health can schedule a same-day or next-day appointment to speak with a counselor by calling Counseling Services. Counselors are available at any time, day or night for students in crisis at this number: 214-768-2277 (then select option 2) They will be connected with a counselor immediately. Students seeking ongoing counseling should call the same number (214-768-2277, then select option 1) during normal business hours to schedule an initial appointment.
- **Campus Carry Law:** In accordance with Texas Senate Bill 11, also known as the 'campus carry' law, and following consultation with entire University community, SMU chooses to remain a weapons-free campus. Specifically, SMU prohibits possession of weapons (either openly or in a concealed manner) on campus. For more information, please see smu.edu/campuscarrylaw.