Linear Optimization and Decision Making, Math 3385.001
Department of Mathematics and Statistics
Fall 2020

“Masks are required for all classes and labs. In lectures, students may remove the mask once seated as long as social distance is maintained, and the instructor may remove the mask while delivering the lecture and maintaining social distance. Masks must be replaced and worn when leaving lecture rooms. Instructors and students must keep masks in place for the duration of labs due to the close interactions. Extra masks will be made available if needed.”

A. COURSE INFORMATION
   Course number/section: MATH 3385.001
   Class meeting time: MWF 12-12:50 PM
   Class location: BH-128
   Course Website: bb9.tamucc.edu

B. INSTRUCTOR INFORMATION
   Instructor: Alexey Sadovski
   Office location: CI 319
   Office hours: Tuesday to Thursday, 9:30 to 11 AM
   Wednesday, 1 to 3 PM
   Telephone: 361-825-6028
   E-mail: george.tintera@tamucc.edu
   Appointments: Appointments outside of office hours are available by request

C. COURSE DESCRIPTION
   This course introduces the linear programming and optimization problems arising in many applications. Contents include linear programming models with solutions, the simplex method, duality theory and its use for management decision making, dual simplex method and sensitivity analysis. Matrix Games.

D. PREREQUISITES AND COREQUISITES
   MATH 2413 and MATH 3311. There are no co-requisites.

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES
   Textbook N/A, Reading material will be provided.

F. STUDENT LEARNING OUTCOMES AND ASSESSMENT
   Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The students learning outcomes
for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

Upon successful completion of this course, students should be able to:

Represent situations as linear programming and more general optimization problems.
1. Apply graphical, tabular and algebraic techniques to solve optimization problems.
2. Interpret solutions to mathematical problems.
3. Use duality to express and solve problems.
4. Make appropriate calculations with a calculator and a software package.
5. Investigate problems beyond what is taught in the course.
6. Know how to apply matrix games and their relations to linear programming.

G. INSTRUCTIONAL METHODS AND ACTIVITIES

The class uses the lecture format with student participation and discussion. The primary tool for investigations will be graphing calculators and Excel. Other software may be used.

H. MAJOR COURSE REQUIREMENTS AND GRADING

Grades will be calculated by homework, test, and exam, according to the following percentages.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Midterm Test</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
</tbody>
</table>

Quizzes: Mastery quizzes will be given the first 20 minutes of most Thursday classes. They will check understanding of fundamentals.

Midterm Test will be over the material in the first part of the semester

Project will be on the topic selected by student and approved by the professor to apply material learned to the real life situations.

Final Test will take place December 1st at 8 AM in our assigned classroom.

Your final grade will be assigned according to the following table:

<table>
<thead>
<tr>
<th>Point Total</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 90%</td>
<td>A</td>
</tr>
<tr>
<td>≥ 80%</td>
<td>B</td>
</tr>
<tr>
<td>≥ 70%</td>
<td>C</td>
</tr>
</tbody>
</table>
### I. COURSE CONTENT/SCHEDULE

**Course Schedule:**

<table>
<thead>
<tr>
<th>Week of</th>
<th>Tuesday</th>
<th>Thursday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 17</td>
<td>Syllabus, Optimization</td>
<td>Intro to Linear Programming</td>
</tr>
<tr>
<td>Aug 24</td>
<td>Matrices and Vector Spaces</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>Aug 31</td>
<td>Q1, General Linear Programming</td>
<td>E1, Solutions to LP problems</td>
</tr>
<tr>
<td>Sept 7</td>
<td>Simplex Computations</td>
<td>Slack Variables</td>
</tr>
<tr>
<td>Sept 14</td>
<td>Q2, General Simplex Method</td>
<td>E2, Inverse Forms</td>
</tr>
<tr>
<td>Sep 21</td>
<td>Primal Dual Problems</td>
<td>Interpretations of Primal Dual Problems</td>
</tr>
<tr>
<td>Sep 28</td>
<td>Q3, Perturbation Techniques</td>
<td>E3, Parametric Objectives</td>
</tr>
<tr>
<td>Oct 5</td>
<td>Sensitivity Analysis</td>
<td>Interpreting Sensitivity</td>
</tr>
<tr>
<td>Oct 12</td>
<td>Q4, Review</td>
<td>Test</td>
</tr>
<tr>
<td>Oct 19</td>
<td>Computation Considerations 1</td>
<td>E4, Computational Considerations 2</td>
</tr>
<tr>
<td>Oct 26</td>
<td>Q5, Transportation Problems</td>
<td>Variations on Transportation Problems</td>
</tr>
<tr>
<td>Nov 2</td>
<td>Scheduling Problems</td>
<td>Inventory Control</td>
</tr>
<tr>
<td>Nov 9</td>
<td>Diet Problems</td>
<td>Thanksgiving - No Class</td>
</tr>
<tr>
<td>Nov 16</td>
<td>Game Theory</td>
<td>E5, Non-linear Programming</td>
</tr>
<tr>
<td>Nov 23</td>
<td>Review</td>
<td>Reading Day – No Class</td>
</tr>
<tr>
<td>Dec 7</td>
<td>Final Exam on Thursday, December 7, 11AM - 1:30 PM in BH-128</td>
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</tr>
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</table>

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.
J. COURSE POLICIES

COVID-19

Face Coverings—Face coverings (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Extra masks will be made available if needed.

• Attendance/Tardiness
  I will check the attendance in every class. Attendance is mandatory by Texas A&M University. Please save absences for emergencies.

• Late Homework Assignments
  Late assignments will not be accepted, unless exceptional circumstances prevent you from completing them. Extension of deadlines will be at the instructor’s discretion. Late assignments may result in partial or total loss of credit. There are NO make-ups for exams or in-class activities.

• No Make-up for Midterm/Final Exams
  Missed Exam:
  No make-ups will be given without written evidence of an Official University excused absence. For an absence to be considered excused, the student must notify his or her instructor in writing (acknowledged e-mail message is acceptable) prior to the date of absence if such notification is feasible. In cases where advance notification is not feasible (e.g. accident or emergency) the student must provide notification by the end of the second working day after the absence. In the case of illness or injury, students are required to obtain a confirmation note from a health care professional affirming date and time of a medical office visit regarding the illness or injury.

• Extra Credit
  There will be no extra credit for this course. Do your best to complete the work assigned.

• Cell Phone Use
  Please silence phone before coming to class. If you need to make a call, please go outside the classroom. ANY USE OF A CELL PHONE OR WIRELESS DEVICE DURING A TEST CARRIES THE PRESUMPTION OF CHEATING. A GRADE OF 0 WILL BE AWARDED FOR THAT ASSIGNMENT FOR USING, TOUCHING OR GLANCING AT A CELL PHONE OR WIRELESS DEVICE.

• Laptop Use
  Laptops, or any form of a new technology device is NOT allowed in the classroom during lecture and exam.
Food in Class
Food is not allowed in the classroom.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

• Classroom/Professional Behavior
Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

• Statement of Civility
Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• Deadline for Dropping a Course with a Grade of W (University)
I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you decide to drop this course. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar (http://www.tamucc.edu/academics/calendar/) for the last day to drop a course.

• Grade Appeals (College of Science and Engineering)
As stated in University Procedure 13.02.99.C0.03, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is required to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure
13.02.99.C0.03, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://academicaffairs.tamucc.edu/rules_procedures/assets/13.02.99.c0.03_student_grade_appeals.pdf. For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

http://disabilityservices.tamucc.edu/

- **Civil Rights Complaints**
Texas A&M University-Corpus Christi is committed to fostering a culture of caring and respect that is free from discrimination, relationship violence and sexual misconduct, and ensuring that all affected students have access to services. For information on reporting Civil Rights complaints, options and support resources (including pregnancy support accommodations) or university policies and procedures, please contact the University Title IX Coordinator, Sam Ramirez (Samuel.ramirez@tamucc.edu) or Deputy Title IX Coordinator, Rosie Ruiz (Rosie.Ruiz@tamucc.edu) x5826, or visit website at Title IX/Sexual Assault/Pregnancy.

**Limits to Confidentiality.** Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees, including instructors, are not able to maintain confidentiality when it conflicts with their responsibility to report alleged or suspected civil rights discrimination that is observed by or made known to an employee in the course and scope of their employment. As the instructor, I must report allegations of civil rights discrimination, including sexual assault, relationship violence, stalking, or sexual harassment to the Title IX Coordinator if you share it with me.

These reports will trigger contact with you from the Civil Rights/Title IX Compliance office who will inform you of your options and resources regarding the incident that you have shared. If you would like to talk about these incidents in a confidential setting, you are encouraged to make an appointment with counselors in the University Counseling Center.

- **Statement of Academic Continuity**
In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However,
students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. OTHER INFORMATION

- Academic Advising
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

GENERAL DISCLAIMER
I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.