

EMIS 8360 - Fall 2020

## Operations Research Models

Mondays and Wednesdays: 2:00 pm - 3:15 pm Caruth 0161

**Instructor(s)** : Dr. Harsha Gangammanavar  
**Contact** : harsha@smu.edu; 214-768-3076  
**Office** : Zoom meeting room ID: 99147075775  
**Office hours** : Only by appointment.

**Description:** *The course is mainly designed to present an overview of models and optimization techniques employed in operations research and management science to students pursuing MS degree in EMIS programs. The course is also suitable for pursuer of MS degree in other related engineering programs and doctoral students who seek an introduction to operations research. Topics include linear, non-linear, integer and dynamic programming, decision making under uncertainty, and sequential decision models. Topics in queueing and simulation models will also be briefly introduced. In addition to models, a classical computational solution approaches for linear programming models (the Simplex method) will be presented to familiarize students with this important component of operations research study.*

**Objectives:** This course has been designed to enable students to

- Write down algebraic formulation of optimization models under the assumption of data certainty. These models include linear, non-linear and integer programming.
- Use algebraic modeling language to model practical applications and solve them using a computer.
- Perform post-optimality sensitivity analysis to verify changes in solutions when model parameters are varied.
- Build and solve an important class of optimization models, viz., network optimization models.
- Comprehend and build queueing system and simulation models.
- Extend their understanding of linear programs to model decision making under uncertain and sequential settings.

### Course Material:

- **Textbook:** Hamdy A. Taha, *Operations Research: An Introduction*, Pearson, 10th edition, 2017, ISBN-13: 9780134444017.  
Earlier versions are acceptable, but references in class lectures and homework assignments will follow the 10th edition. Students are responsible to ensure consistency.
- **References:**
  1. Frederick S. Hillier and Gerald J. Lieberman, *Introduction to Operations Research*, McGraw-Hill, tenth edition, 2015, ISBN: 0073523453.
  2. AMPL: Robert Fourer, David M. Gay, and Brian W. Kernighan, *AMPL: A Modeling Language for Mathematical Programming*, Second edition, ISBN 0-534-38809-4 (available online: [here](#)).
- **Other material:** Select lecture notes, homework exercises and their solutions, course announcements, and other course related material will be posted on SMU Canvas course page.
- Homework assignments will require the use of OR/MS software packages AMPL and CPLEX. Visit the AMPL website to download free copies of the student versions of AMPL and CPLEX for your choice of operating system. It will be beneficial to bring a laptop to class with AMPL and CPLEX installed.

**Course Requirement and Grading:**

- **Homework:** Regular homework assignments will be assigned over the semester to help you understand the concepts developed in the class. You are encouraged to discuss the course material, including homework, with other students. However, you are completely responsible for your submission. Please follow the underlying guidelines:
  - a. You will turn in your assignment electronically on the Canvas course page.
  - b. Submissions should be made a single file (\*.doc or \*.pdf). When the assignment includes computer codes and you are asked to submit the code, copy them into the same submission file.
  - c. If you prefer to write down your homework, then make sure your handwriting is legible, scan and combine them together into a single PDF file. Please do not upload photographs clicked on your mobile devices.
  - d. The file should be named as follows: *lastname\_hw#.pdf* or *lastname\_hw#.doc*. For example, Jane Doe’s Homework-5 submission will be named *doe\_5.pdf*.
  - e. **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.).

Failure to follow the above guidelines will result in incremental penalty points.

- **Examinations:** All exams will be “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.
  - Examination-1: October 14-15, 2020 (online using ProctorU).
  - Examination-2: December 15, 2020 (online using ProctorU).

- **Grade distribution:**

Homework	Examination-1	Examination-2
60%	15%	25%

**Tentative course plan:** The following are the tentative topics and lecture assignments:

- Linear programming (7 lectures)
- Network optimization (4 lectures)
- Integer programming (5 lectures)
- Non-linear programming (2 lectures)
- Queueing systems (2 lectures)
- Simulation models (2 lectures)
- Decision under uncertainty (3 lectures)
- Sequential decision models (3 lectures)

**University policies:**

- **Disability Accommodations:** Students needing academic accommodations for a disability must first register with Disability Accommodations and Success Strategies (DASS). Students can call 214-768-1470 or visit <http://www.smu.edu/Provost/SASP/DASS> to begin the process. Once approved and registered, students will submit a DASS Accommodation Letter to faculty through the electronic portal DASS Link and then communicate directly with each instructor to make appropriate arrangements. Please note that accommodations are not retroactive and 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. (<https://www.smu.edu/StudentAffairs/Chaplain/ReligiousHolidays>).
- **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 missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (See 2020-2021 SMU Undergraduate Catalog under “Enrollment and Academic Records/Excused Absences.”)
- **Student Academic Success Programs:** Students needing assistance with writing assignments for SMU courses may schedule an appointment with the Writing Center through Canvas. Students wishing support with subject-specific tutoring or success strategies should contact SASP, Loyd All Sports Center, Suite 202; 214-768-3648; <https://www.smu.edu/sasp>.
- **Accommodations for pregnant and parenting students:** Under Title IX students who are pregnant or parenting may request academic adjustments by contacting Elsie Johnson ([elsiej@smu.edu](mailto:elsiej@smu.edu)) in the Office of the Dean of Students, or 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.
- **University Honor Code:** Students are reminded that the SMU honor code (see <http://www.smu.edu/StudentAffairs/StudentLife/StudentHandbook/HonorCode>) applies to this course. Honor Code violations will be dealt with in a manner determined by the instructor.
- **“Campus Carry” law:** In accordance with Texas Senate Bill 11, also known as the “campus carry” law, following consultation with entire University community SMU determined 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 [http://www.smu.edu/BusinessFinance/Police/Weapons\\_Policy](http://www.smu.edu/BusinessFinance/Police/Weapons_Policy).
- **Covid-19 Attendance:** Students who are experiencing COVID-19 symptoms or who have been notified through contact tracing of potential exposure and need to self-quarantine or isolate must follow the protocols laid out in SMU’s Contact Tracing Protocol. To ensure academic continuity, students in these situations will not be penalized and will be provided appropriate modifications to assignments, deadlines, and testing. Please also note that SMUFlex classes might, in rare circumstances, go remote for two-week periods to accommodate COVID-related issues. To ensure these necessary accommodations, affected students must:
  - Provide as much advance notification as possible to the instructor about a change in circumstances. Students must notify their instructor about a potential absence as well as plans for a return to class. For cases in which students test positive for COVID-19, they should fill out a CCC form at [https://cm.maxient.com/reportingform.php?SouthernMethodistUniv&layout\\_id=1](https://cm.maxient.com/reportingform.php?SouthernMethodistUniv&layout_id=1).
  - Communicate promptly with the instructor to establish, as necessary, alternative assignments and/or changes to deadlines and exams. Students are then responsible for meeting the expectations laid out in these alternative arrangements.
  - Continue participation in class via Zoom, as health circumstances permit. Attend class regularly, when not in a situation outlined above, in accordance with safety measures laid out by SMU CAN in the Pledge to Protect (including wearing masks, maintaining social distancing, and cleaning personal space after class). In-person participation in SMUFlex classes is required on students’

assigned red/blue rotation days except in cases when students are experiencing illness, are in self-quarantine or in isolation.

- Students facing multiple or extended COVID-19-related absences or illness can work with the Office of the Dean of Students to consider options such as fully remote learning or medical withdrawal.